DOCUMENT RESUME

ED 421 053 HE 031 396

AUTHOR	Akerhielm, Karen; Berger, Jacqueline; Hooker, Marianne; Wise, Donald
TITLE	Factors Related to College Enrollment. Final Report.
INSTITUTION	Mathtech, Inc., Princeton, NJ.
SPONS AGENCY	Department of Education, Washington, DC. Office of the Under Secretary.
PUB DATE	1998-00-00
NOTE	96p.
CONTRACT	EA94078001
PUB TYPE	Reports - Research (143)
EDRS PRICE	MF01/PC04 Plus Postage.
DESCRIPTORS	Academic Achievement; *Academic Aptitude; Academic Persistence; Access to Education; *College Attendance; Educational Demand; Enrollment; Higher Education; *Minority Groups; *Student Characteristics; *Student Educational Objectives; *Student Financial Aid
IDENTIFIERS	National Education Longitudinal Study 1988

ABSTRACT

Using data from the National Education Longitudinal Study of 1988, this study examined factors related to postsecondary education enrollment, focusing on the impact of early indicators and financial aid. Major findings of the report indicated the following: (1) a majority of students, 63 percent by 1994, attended some type of postsecondary institution; (2) most students attend public institutions (four-year or less); (3) Native Americans, Blacks, and Hispanics are least likely and Asians/Pacific Islanders most likely to attend postsecondary institutions; (4) postsecondary education increases with family income; (5) low-income students are less likely than higher income students to attend 4-year schools, even among high-test-score students; (6) students in the bottom income, top-test-score group are most likely to enter the armed forces; (7) nonfinancial reasons for not planning to attend postsecondary institutions are similar across the income spectrum, with students most likely to report taking time off before continuing their education; (8) educational expectations, academic preparation, course-taking behavior, and behaviors such as having children or using drugs influence postsecondary education attendance; (9) there is a relationship between parental attitudes, financial aid, and attendance at postsecondary institutions; and (10) predicted amounts of financial aid have no statistically significant effect on postsecondary enrollment. (Contains 34 references and appendix contains variable definitions.) (CH)

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ED 421 053

Contract No.: EA94078001
Task Order No.: EA950860
Mathtech No.: 3360-028

FACTORS RELATED TO COLLEGE ENROLLMENT

FINAL REPORT

Prepared for:

Office of the Under Secretary
U.S. Department of Education
Washington, DC 20202

Prepared by:

Karen Akerhielm
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This report was prepared under the U.S. Department of Education Contract #EA94078001. The views expressed in this report do not necessarily reflect the position or policy of the Department, and no official endorsement by the Department should be inferred.

ACKNOWLEDGMENTS

We would like to thank Dan Goldenberg and Andrew Lauland of the Planning and Evaluation Service (PES) of the U.S. Department of Education for their many thoughtful comments and insights during the course of this project, and for their guidance in turning this study into a more focused and readable final report. We also are grateful to Liz Eisner of PES for her helpful suggestions, and Jeff Owings of the National Center for Education Statistics for his assistance with the NELS data set. Finally, we would like to thank Gail Gay of Mathtech for her help in producing the final document.

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EXECUTIVE SUMMARY

As the returns to a college education have increased, there has been concern that access to postsecondary education (PSE) is not as widespread as is desired. Using data from the National Education Longitudinal Study of 1988 (NELS), a survey that follows more than 13,000 students from the eighth grade through the second year after high school, this study examines factors related to PSE enrollment. The emphasis is on how early indicators, such as expectations and course-taking behavior in the eighth grade, are related to college attendance six years later. We examine attendance at all types of PSE, and at 4-year public, 4-year private, less than 4-year public, and less than 4-year private institutions. However, we do not examine selectivity of institutions attended.

A secondary goal of the study is to examine whether financial aid availability is a critical factor in determining PSE attendance. We examine knowledge and attitudes toward financial aid and the relationship between such beliefs and PSE attendance. We also examine the effect of financial aid receipt on PSE attendance, as well as the effect of predicted financial aid amounts on PSE attendance.

WHO GOES TO COLLEGE?

We begin our analysis by examining the demographics of postsecondary school choice. All results here apply to the population of Spring 1988 eighth graders. Among our findings are:

- **A majority of students attend some type of PSE.** By 1994, 63 percent of those in eighth grade in 1988 attend some type of PSE.
- **Students are most likely to attend a 4-year public or a less than 4-year public school.** Overall, 24 percent of respondents attend a 4-year public institution, 11 percent attend a 4-year private institution, 24 percent attend a 2-year public college, and 3.5 percent attend a less than 4-year private institution. The remaining 37 percent do not attend PSE.

- **Native Americans, Blacks, and Hispanics are least likely to attend PSE and Asians/Pacific Islanders are most likely to attend PSE.** While 79 percent of Asians attend PSE, 66 percent of Whites, 53 percent of Hispanics, 52 percent of Blacks, and 38 percent of Native Americans attend PSE.

We divide the sample into three approximately equal income and test score groups on the basis of family income and base year test score.[1] We find the expected relationships between income, test score, and PSE attendance:

- **PSE attendance increases with family income.** While nearly 44 percent of the bottom family income group attends PSE, 69 percent of the middle income group attends PSE, and 86 percent of the top income group attends PSE.

- **Even within the high test score group, income is still related to PSE attendance. However, these income differences are greatly reduced when test scores are controlled for.** While 75 percent of those in the low income, top test score group attend PSE, 86 percent of those in the middle income, top test score group attend PSE, and 95 percent of those in the top income, top test score group attend PSE. One interesting finding is that low income, high test score students attend PSE at a higher rate than the high income, low test score individuals (75 percent versus 64 percent.)

- **Income effects are larger for low test score students than they are for high test score students.** The difference in the rate of PSE attendance between top and bottom income groups in the bottom test group is 35 percentage points, while the difference in the top test score group is 20 percentage points.

- **For those in PSE, low income students are less likely to attend 4-year schools than higher income students, even among high test score students.** While 65 percent of those individuals in the bottom income, top test score group who attend PSE attend a 4-year college, 69 percent of those in the middle income, top test score group and 82 percent of those in the top income, top test score group attend a 4-year college.

- **For those in PSE, low income students are disproportionately found in public institutions relative to higher income students, even within the group of high test score students.** While 31 percent of low income, high test score students who attend 4-year institutions attend private schools; 39 percent of high income, high test score students attend private schools.

[1] See Appendix for a description of the test score.

OTHER ACTIVITIES PURSUED AFTER HIGH SCHOOL

We also examine educational and other activities that respondents engage in after high school. We find that:

- **Lower income students are more likely to be working while in PSE than higher income students.** While over 45 percent of the top income, top test score group takes academic courses and does not work, 28 percent of the middle income, top test score group, and only 19 percent of the low income, low test score group takes academic courses and does not work.

- **Those in the bottom income, top test score group are most likely to enter the armed forces.** While 4 percent of those in the bottom income, top test score group enter the military, 2 percent of those in the middle income, top test score group, and less than 1 percent of those in the top income, top test score group enter the military.

REASONS WHY STUDENTS DO NOT ATTEND PSE

We next examine reasons students give for not attending PSE. Some of the key results are:

- **Non-financial reasons for not planning to attend PSE are similar across the income spectrum.** All of the groups of students are most likely to report that they do not plan to attend PSE because they plan to take time off before continuing their education.

- **Low income students are more likely than higher income students to report that they cannot afford school and that they have to support their families.** Of those students who say they do not plan to attend PSE immediately after high school, 57 percent of the bottom income, top test score students report that it is because they cannot afford to attend, 38 percent of the middle income, top test students give this reason, and 21 percent of the top income, top test score students give this reason.

FACTORS RELATED TO PSE ATTENDANCE

Three factors that we expect to be related to PSE attendance are educational expectations, course-taking behavior, and behavioral variables. We find that:

Educational Expectations

- **Educational expectations are highly correlated with PSE attendance**. While 19 percent of those who expect in the eighth grade to just graduate from high school actually attend PSE, 73 percent of those who in eighth grade expect to obtain a bachelor's degree attend college, and 83 percent of those who expect to obtain a master's degree or higher attend college.

Course-Taking Behavior

- **Even those low income students who take rigorous academic high school programs are still less likely to attend PSE. However, differences by income are fairly small when high school program type is accounted for.** While 12.5 percent of the bottom income students in the rigorous academic program do not attend any PSE, 7 percent of the middle income students and 3.6 percent of the top income students in the rigorous high school program do not attend PSE.

- **When taking geometry is accounted for, income effects on PSE attendance diminish, but are still present.** Among those students who take geometry, 94 percent of the high income students, 84 percent of the middle income students, and 71 percent of the bottom income students attend PSE.

- **Low income students who take advanced math and science courses are more likely to attend PSE than low income students who do not take these courses.** While 76 percent of low income students who took algebra II in high school went to college, only 32 percent of low income students who did not take algebra II went to college.

- **Individuals in the top family income group are more likely than those in the lower income groups to take the math and science courses associated with PSE attendance.** Only 46 percent of low income students took geometry in school, while 69 percent of middle income students and 82 percent of high income students did.

Behavioral Variables

- **Individuals who use drugs or alcohol, spend more time watching television, cut classes, and spend less time doing homework are less likely to attend PSE.** Of those 10th graders who reported using marijuana more than twice in the past 12 months, 48 percent went to PSE while 69 percent of the 10th graders who did not report using marijuana attended PSE.

- **Students who are married, have children, or expect these events by age 21 are less likely to attend PSE than those who do not.** For those students who expected to be married by age 21, 46 percent went on to PSE. This compares to 76 percent of those students who did not expect to be married by age 21.

Next we examined the relationship between these factors and PSE attendance in a multivariate framework. This allows us to examine the effect of each factor on college attendance after controlling for all of the other factors in the model. A multivariate model estimates the marginal effect that an independent variable, such as parental education, has on a dependent variable (whether the students attends PSE) holding all other independent variables constant. The following are some of the statistically significant results:

- **Gender:** Other things equal, women are more likely to attend PSE than are men.

- **Income:** Students in higher income groups are more likely to attend PSE.

- **Parents' Education:** Students whose parents had higher education levels are more likely to attend PSE.

- **Academic Preparation and Course-Taking Results:** Students with higher standardized test scores, who took college preparatory classes, and who attend Catholic or other types of private schools are more likely to attend PSE.
- **Expectations and Behavioral Results:** Students who have higher educational expectations, who do not have children, and who do not use marijuana are more likely to attend PSE.

- **Low Income, High Test Score Student Results:** Factors that are more important for this group than for the entire group of students are watching television, spending more time on homework, and living in an urban area. While watching television and living in an urban area are negatively related to PSE attendance, spending more time on homework is positively related to PSE attendance. Low income, high test score students who watch fewer hours of television, spend more

time on homework, or do not live in an urban area are more likely to attend PSE, but this is not true for the sample as a whole.

When we separately model the five distinct PSE attendance choices in a multivariate framework, we find that:

- **Demographic Results:** Women are more likely than men to attend all four types of schools, but the largest difference is seen in the less than 4-year private schools. Controlling for other factors, Blacks are more likely than Whites to attend 4-year private institutions. Respondents whose parents received a bachelor's degree or higher are most likely to attend a 4-year private institution.

- **Academic Preparation and Course-Taking Results:** Higher test scores, taking college preparatory courses, being in a college preparatory program, and expecting a bachelor's degree or higher are associated with increased attendance at all four types of schools, but increase the likelihood of attending a 4-year private institution by the largest amount.

THE ROLE OF FINANCIAL AID

We next examine parental attitudes toward college expenses and financial aid. We expect that their views are likely to have an effect on students' expectations about their education, and, ultimately, their PSE attendance. Among our findings:

- **A number of parents believe that availability of information on financial aid is insufficient, but the percentage declines as income increases.** Nearly one-quarter of the parents say that they have not been able to get much information about financial aid. While 25 percent of those in the top test score, bottom income group say that they have not been able to get much information on how to apply for financial aid, 21 percent of those in the top test score, middle income group and 14 percent of those in the top test score, top income group gave this response.

- **There appears to be a relationship between parental attitudes toward financial aid and PSE attendance.** While 27 percent of bottom income, bottom test score group students whose parents say they do not see any way of getting enough money for college attend PSE, 35 percent whose parents say this is false or have not thought about it attend PSE. Similarly, while 43 percent of bottom income, middle test score students whose parents say that they do not see any way of

getting enough money for college attend PSE, 56 percent of those who say this is false or have not thought about it, attend PSE.

Students and their parents can learn about financial aid by several avenues. These include talking to teachers, counselors, school representatives, or loan officers, and reading information from the U.S. Department of Education, from high schools or colleges, or from the military. We studied the extent to which students and their parents take advantage of these resources, and found that:

- **Middle income parents are most likely to use these resources.** While 55 percent of bottom income parents spoke to someone about financial aid, 67 percent of middle income parents spoke to someone, and 62 percent of top income parents spoke to someone.

- **In some cases, the use of financial aid information has a strong relationship to knowledge about financial aid.** While 26 percent of parents who did not read information about financial aid say that they did not apply for financial aid because they did not know how, only 13 percent of parents who did read information give this reason. While 24 percent of parents who did not read information about financial aid said they had not been able to get much information about how to apply for financial aid, only 15 percent of those who did read information gave this as a reason for not applying for financial aid.

- **Of those planning to attend PSE in the 12th grade, students with parents who talk or read about financial aid are more likely to attend PSE than those with parents who do not act to obtain information about financial aid.** While 80 percent of students whose parents speak to someone about financial aid attend PSE, only 54 percent of students whose parents do not speak to someone about financial aid attend PSE.

Next we examine the effect of being offered financial aid on PSE attendance. We compare PSE attendance for those students who apply, are accepted, apply for financial aid, and are offered aid at private 4-year institutions with those students who apply, are accepted, apply for financial aid, but are not offered financial aid at private 4-year institutions. The same analyses are done for public 4-year institutions. We find that:

- **Respondents who are offered financial aid at private 4-year institutions are more likely to attend private 4-year institutions than are respondents who apply, are accepted, and apply for aid, but are not offered aid at private 4-year institutions.** While 72 percent of those who are offered aid at private 4-year institutions attend private 4-year institutions, only 61 percent of those who are not offered aid at private 4-year institutions attend this type of PSE.

- **Respondents who are not offered aid at private 4-year institutions are more likely to attend public 4-year institutions than those who are offered aid at private 4-year institutions.** While 15 percent of those who are offered aid at private 4-year institutions attend public 4-year institutions, 20 percent of those who are not offered aid at private 4-year institutions attend public 4-year institutions.

- **Being offered financial aid at a private 4-year institution does not appear to be related to the decision of whether or not to attend any type of PSE.** While 3 percent of those who are offered aid at a private 4-year institution do not attend PSE, 5 percent of those who are not offered aid at a private 4-year institution do not attend PSE.

- **Respondents who are offered financial aid at public 4-year institutions are more likely to attend public 4-year institutions than are respondents who apply, are accepted, and apply for aid, but are not offered aid at public 4-year institutions.** While 77 percent of those who are offered aid at public 4-year institutions attend public 4-year institutions, only 68 percent of those who are not offered financial aid at public 4-year institutions attend public 4-year institutions.

- **Low income respondents who are not offered financial aid at public 4-year institutions are more likely not to attend any type of PSE.** While 4 percent of bottom income students who are offered financial aid at 4-year public institutions do not attend PSE, 13 percent of bottom income students who are not offered financial aid at 4-year public institutions do not attend PSE.

- **High income respondents who are not offered aid at public 4-year institutions are more likely to attend less than 4-year public institutions.** While 14 percent of top income students who are offered financial aid at public 4-year institutions attend less than 4-year public institutions, 22 percent of top income students who are not offered financial aid at 4-year public institutions attend less than 4-year public institutions.

We next employ a modeling framework to examine the effect of financial aid on PSE attendance at public and private 4-year institutions. We find that:

- **Private 4-Year Institutions:** In a multivariate framework, respondents who are offered financial aid at a private 4-year institution are more likely to attend a private 4-year institution than those who apply, are accepted, apply for aid but are not offered aid at a private 4-year institution.

- **Public 4-Year Institutions:** In a multivariate framework, respondents who are offered financial aid at a public 4-year institution are more likely to attend a public 4-year institution than those who apply, are accepted, apply for aid but are not offered aid at a public 4-year institution.

The prior analysis was limited to only a small sample of students who apply to PSE, are accepted, and apply for financial aid. For example, of our full sample of respondents included in our multivariate model of who goes to college, 7 percent are included in this analysis of the effects of financial aid availability at private four-year institutions and 14 percent are included in the 4-year public institutional analysis.

Since the above analysis does not address the effect of financial aid on the decision to first apply to PSE and then apply for financial aid, it is necessary to impute financial aid awards for all students. To examine the effect of financial aid on PSE attendance for all students, predictions of financial aid eligibility are made using the National Postsecondary Student Aid Study (NPSAS). Using these predicted aid levels, we find that:

- **Predicted amounts of financial aid, whether via regressions or a matching technique, have no statistically significant effect on PSE attendance.** The reason may be that expected financial aid does not affect PSE attendance, that financial aid does not vary much for families with similar financial characteristics, or that data limitations preclude doing a good job of predicting financial aid.

POLICY IMPLICATIONS

The strong correlation between educational expectations (even in the eighth grade), high school curriculum, and PSE attendance points to the importance of early intervention for PSE attendance. Students form their educational expectations early, and courses taken early on in high school and junior high (or middle school) are closely related to PSE attendance. This indicates that the end of high school may be too late a time to inform students of the importance

of a college education. Rather, information on the importance of college and the course requirements for college admission should be distributed to students and their parents as early as possible in the educational system. In general, efforts should be made to ensure that the low income students are kept in the college preparatory track, that they take math and science courses, and that homework is stressed.

Evidence also shows the importance of financial aid knowledge, information, and receipt on PSE attendance. A full one-quarter of the parents said they had not been able to get enough information about financial aid in the eighth grade, and about a quarter of the low income parents did not apply for financial aid because they did not know how to apply. This suggests that information on the financial aid process should be made available to students and their parents as early as possible in the educational system. Both the descriptive findings and the multivariate model results show that even after holding academic preparation and other factors constant, income effects remain. This implies that financial constraints for attending college are more binding for the low income students, even controlling for various academic characteristics, and that public policy has a role to play in alleviating some of these constraints.

I. INTRODUCTION

Income inequality has been increasing for the past 20 years. A substantial part of the increase in income differences can be explained by changes in the return to education. In dollar terms, 1973 college graduates earned 45 percent more than high school graduates; by 1994 they earned 65 percent more, based on real average hourly wages for college and high school graduates (Baumol and Blinder, 1997). The increasing income disparities between groups of differing educational attainment raises concern that access to postsecondary education (PSE) may not be as widespread as desired. President Clinton urged for the goal of universal college access in his 1997 State of the Union address, "We must make the thirteenth and fourteenth years of education—at least two years of college—just as universal in America by the 21st century as a high school education is today, and we must open the doors of college to all Americans."

Using data from the National Education Longitudinal Study of 1988 (NELS) and the National Postsecondary Student Aid Study (NPSAS), this study examines access to postsecondary education by individuals in different income and test score groups. While many studies have found a statistically significant effect of income on college enrollment,[1] less attention has been paid to the effect of family income after controlling for student achievement. This study specifically addresses this issue. We also explore differences in the decision of whether or not to attend PSE or in the type of PSE attended. We are interested in whether students are substituting less expensive alternatives (such as public or 2-year institutions) for high cost institutions, or whether they are not attending PSE at all. However, we do not examine selectivity of institutions attended.

Another goal of this study is to determine which factors, including high school experiences, are especially important in determining college enrollment patterns. Hossler and Maple (1993) find that information on individual background factors allows them to predict, with a high degree of accuracy, which ninth-graders will go to college. The emphasis in our study is on how

[1]See, for example, Leslie and Brinkman (1987), Savoca (1990), Schwartz (1986), and Mortenson and Wu (1990).

early indicators, such as expectations and course-taking behavior in the eighth grade, are related to college attendance six years later.[2]

Last, we explore whether financial aid availability is a critical factor in determining PSE attendance. The combined effects of shifting federal support from grants to loans, and college tuition increasing at a rate faster than inflation are expected to have a large impact on enrollment patterns for low income youth. This report examines knowledge of and attitudes toward financial aid, and the relationship between such factors and PSE attendance. We also examine the effect of financial aid receipt on PSE attendance.

In summary, the main research questions addressed in this report are:

1. What percentage of students attend PSE, and what types of PSE do they attend?
2. How are income and test score related to who goes to college?
3. What factors, including high school experiences, are especially important in determining college enrollment patterns?
4. Is financial aid availability a critical factor for determining PSE attendance?

The rest of the report proceeds as follows. Section II describes the literature on individual and institutional factors that affect PSE attendance. Section III provides an overview of the data used in this report. It describes the NELS data, the NPSAS data, samples and weights used in the study, and correction of standard errors for sampling techniques. Section IV examines who goes to college. The section highlights the main answers to the first two research questions posed above, in a univariate or multivariate framework. Section V examines factors related to PSE attendance. Section VI explores the importance of financial aid, including knowledge of financial aid, financial aid applications, and the relationship between being offered financial aid and PSE attendance. Last, we include a bibliography of cited references. The executive summary (at the beginning of the report) highlights our findings and provides policy implications.

[2]An NCES study, not yet released, has focused on the "pipeline to higher education" using the NELS data (NCES, 1997).

One subset of analysis for this study is the group of low income, high test score students. Low income, high test score students may have the potential to benefit greatly from PSE attendance and, therefore, we want to identify factors or constraints, particularly financial ones, that might limit the students' educational opportunities beyond high school.

II. LITERATURE REVIEW

Much of the research on college enrollment patterns is founded upon the "human capital" model Gary Becker advanced. According to this theory, one decides to enroll in college as an investment in future earning power. Individuals calculate the value of attending college by comparing costs (direct and indirect) with expected income gains, and they make the decision that will maximize their utility over the long term. To understand enrollment behavior according to this model, it is necessary to look at such factors as tuition levels, student financial aid, average wages for high school graduates, and the difference in lifetime earnings between high school and college graduates.

Economists and others agree, however, that non-monetary factors also play a major part in the college enrollment decision. Sociologists' models of status attainment have suggested a number of background variables that join with economic factors to influence college plans. These include both personal traits (e.g., academic ability) and interpersonal factors, such as the level of encouragement a student receives from parents and teachers. Hossler and Maple (1993) suggest that individual decisions on enrollment can be broken down into three stages: predisposition, search, and choice. According to their research, students who will ultimately attend college can be differentiated from those who will not as early as the ninth grade.

Within the econometric and sociological models outlined above, the factors affecting enrollment in college can be divided into two general types: those specific to individual students, such as academic achievement and parental education levels, and those specific to educational or vocational alternatives, such as college tuition, financial aid, and unemployment levels. Students' enrollment decisions can be viewed as jointly determined by their individual characteristics and the institutional or societal conditions that prevail. We first review individual traits that affect college enrollment, and then institutional determinants.

A. INDIVIDUAL FACTORS THAT AFFECT COLLEGE ENROLLMENT

Several studies have used data from the National Longitudinal Study of the High School Class of 1972 (NLS72), the National Longitudinal Survey of Labor Market Experience, Youth Cohort (NLSY), and the High School and Beyond Survey (HSB) to examine the factors affecting college enrollments. Manski and Wise (1983), Rouse (1994), and a number of others have used the variables included in these data sets to estimate multinomial logit models of enrollment decisions. Among the researchers, there seems to be considerable agreement regarding the individual traits that help to determine enrollment. These traits are discussed below.

Manski and Wise (1983) presented a key point, namely that the enrollment process begins with the student's decision to apply to college. This is much more important than the decisions made by college admissions personnel, since most would-be college students are likely to be admitted to some postsecondary institution of average quality. Jackson (1988) reports that in 1972, more than 97 percent of college applicants were admitted to at least one of their top three choices. The factors of greatest interest, then, are those that cause the student to seek to enroll.

Both Manski and Wise (1983) and Rouse (1994) find that individual traits such as achievement levels, high school class rank, and parental education levels are of primary importance in determining the likelihood of a student's applying to college. They state that higher family income levels increase the probability of application as well, but to a lesser extent. Manski and Wise also cite a " 'peer' or high school quality effect," such that the larger the share of a high school senior's classmates who attend 4-year schools, the more likely he or she will be to do the same. A recent NCES report (1997) describes the relationship among six risk factors (such as changing schools two or more times) and PSE attendance rates.

St. John and Noell (1989) and St. John (1990) draw similar conclusions from the NLS72 and HSB data sets. St. John and Noell state that certain "social background variables" appear to make college enrollment more likely. These include higher test scores, higher grades, higher

maternal education levels,[3] and family income, as cited by Manski and Wise and Rouse. Other key variables include participation in an academic track during high school and "high post-secondary aspirations," as measured by students' reporting of the highest level of schooling they expect to achieve.

Hossler and Maple (1993) find that parental education levels have a stronger effect on enrollment plans than student ability or income level. Other background factors that researchers have found to be significant include the level of parental encouragement (Hossler, Braxton, and Coopersmith, 1989) and students' own expectations about the college decision (Borus and Carpenter, 1984). Jackson (1988) concludes that test scores, grades, taking part in a college preparatory program, and attending a school with many college-going peers are the student attributes most important for college enrollment. Kohn, Manski, and Mundel (1976) report that parents' education level has a positive effect on a student's likelihood of enrollment, but state that this effect decreases as family income rises.

A number of researchers have examined the effects of family income levels on college enrollment. Manski (1992:16) concludes that there are "persistent patterns of stratification of college enrollments by income." Both Manski (1992) and Kane (1995) present census data for multi-year periods that show, for ascending income levels, a steadily increasing percentage of 18- to 19-year-old dependent family members enrolled in college. Using the same data source, Clotfelter (1991) and Mortenson and Wu (1990) cite positive income effects for the 18- to 24-year-old group as well. Hauser (1993) finds large family income effects on college enrollment for White and Hispanic families, but he finds no such effects for Black families.

[3]St. John and Noell do not include paternal education levels as a variable in their study. Manski and Wise and Rouse consider maternal and paternal education levels as separate variables, but present their conclusions in terms of parental education levels as a whole. Most of the studies reviewed here do not distinguish between mother's and father's education levels. One exception is the study by Kohn, Manski and Mundel (1976). This study estimates a model using subsamples of the SCOPE survey from two different states. While one group shows that the father's education level has a greater effect on the likelihood of college attendance than does the mother's, the other group shows the mother's education level as having a greater effect.

B. INSTITUTIONAL FACTORS THAT AFFECT COLLEGE ENROLLMENT

In addition to the factors that operate at an individual level, researchers have found a variety of institutional factors, or factors pertaining to educational and vocational alternatives, that affect college enrollment levels. Manski and Wise (1983) include among these factors tuition level, "quality of school" (as measured by the average combined SAT score of incoming freshmen), and the availability of government and institutional financial aid. Rouse (1994) examines the factor of proximity by estimating changes in enrollments that would result from decreasing the average distance to the nearest 2-year college. She also considers the effects of tuition levels and financial aid availability, as well unemployment rates, which serve as a measure of competing opportunities available to high school seniors.

Tuition levels are another institutional factor with a significant effect on college enrollment. Leslie and Brinkman (1987) review 25 studies on this subject, and find a general consensus that a $100 increase in tuition nationwide, in 1982–1983 academic year dollars, would result in a 6 percent decline in the college participation rate for the 18- to 24-year-old group. Savoca (1990) makes the point that high tuition levels may lessen postsecondary enrollments in the aggregate by discouraging some students from ever applying to college. The effects of tuition levels are moderated in many cases by the effects of financial aid. McPherson and Schapiro (1991) state that the variable of interest should be net cost, or tuition less financial aid. At the initial stages of the enrollment decision, however, students often lack information on their eligibility for financial aid and the amount of aid they would be likely to receive.

Researchers have differing views regarding the effects of financial aid on enrollment at different types of institutions. Reyes (1994) finds that increases in financial aid positively affect both 2-year and 4-year college enrollment rates, based on information from the NLSY and HSB. Manski and Wise (1983), using the NLS72, conclude that financial aid affects students' decisions to attend 2-year institutions, as opposed to not going to college at all. However, this study finds that enrollments at 4-year schools have little sensitivity to the availability of financial aid. Manski and Wise do not consider the effect of financial aid on the student's choice between a 2-year and a 4-year institution.

Other researchers have compared the effects of decreasing tuition with the effects of increasing financial aid. Manski and Wise (1983) find that for those attending 2-year schools, an additional dollar of financial aid would be worth more than a one dollar reduction in tuition. St. John (1990:172) also finds that "college applicants...[are] more responsive to changes in student aid than to changes in tuition," except for those in the upper income group. Kane (1995), however, argues that while financial aid increases may be more equitable because they are means tested, they are not as effective as decreases in tuition. This is a consequence of the complexity of the financial aid application process and the unwillingness of low income families to borrow to finance a college education.

When studying the effect of tuition and financial aid on PSE enrollment, the group to be especially concerned about is low income students. Leslie and Brinkman (1987) and Savoca (1990) find that tuition levels affect enrollment decisions for low income students much more than for middle and upper income groups. By the same token, the availability of financial aid is a much more crucial factor for those at lower income levels. Orfield (1992) notes that the maximum Pell grant is less than one-fifth of the tuition at an elite university. Such a gap between aid and costs, he contends, may steer many low income students toward lower cost schools. Hearn's 1991 study supports this hypothesis. He finds that when academic ability, achievement, and other factors are controlled for, lower income students are especially likely to choose institutions of lower selectivity.

Schwartz (1985) finds that low income students are affected differently by publicly provided financial aid and aid supplied by institutions. He states that public grants tend to promote greater equity among income groups in college enrollment. Private grants, however, are often awarded on the basis of academic ability, and they tend to favor students who could afford to go to college without them. Clotfelter (1991) expresses the same concern about the effects of institutional aid. Manski and Wise (1983) note that even public aid is not always awarded where the need is greatest. They state that in 1979, 59 percent of Basic Educational Opportunity Grants were awarded to students who would probably have gone to college in the absence of such aid.

Table 1 summarizes the data sources used in the studies mentioned here.

Table 1

MAIN DATA SOURCES FOR WORKS CITED IN LITERATURE REVIEW

STUDY	MAIN DATA SOURCES
Borus, Michael E. and Carpenter, Susan A., "Factors Associated with College Attendance of High-School Seniors" (1984)	1979 and 1980 National Longitudinal Surveys of Labor Market Experience, Youth Cohort (NLSY)
Clotfelter, Charles T., "Demand for Undergraduate Education" (1991)	Review of studies done by others, with data from Current Population Survey (CPS) and High School and Beyond (HSB)
Hauser, Robert M., "Trends in College Entry among Whites, Blacks, and Hispanics" (1993)	CPS
Hearn, James C., "Academic and Nonacademic Influences on the College Destinations of 1980 High School Graduates" (1991)	HSB, Higher Education Research Institute (HERI) data
Hossler, Don, Braxton, John and Coopersmith, Georgia, "Understanding College Choice" (1989)	Review of studies done by others
Hossler, Don and Maple, Sue, "Being Undecided about Postsecondary Education" (1993)	Cluster sample of 5,000 Indiana ninth graders
Jackson, Gregory A., "Did College Choice Change during the Seventies?" (1988)	National Longitudinal Study of the High School Class of 1972 (NLS72), HSB
Kane, Thomas, "Rising Public College Tuition and College Entry: How Well Do Public Subsidies Promote Access to College?" (1995)	NLSY, HSB, CPS
Kohn, Meir G., Manski, Charles F., and Mundel, David S., "An Empirical Investigation of Factors which Influence College-going Behavior" (1976)	School to College: Opportunities for Postsecondary Education (SCOPE) Survey
Leslie, Larry L., and Brinkman, Paul T., "Student Price Response in Higher Education" (1987)	Meta-analysis of studies done by others
Manski, Charles F., and Wise, David A., *College Choice in America* (1983)	NLS72
Manski, Charles F., "Income and Higher Education" (1992)	NLS72, HSB, CPS
McPherson, Michael S., and Schapiro, Morton Owen, "Does Student Aid Affect College Enrollment? New Evidence on a Persistent Controversy" (1991)	Cooperative Institutional Research Program (CIRP) data, CPS
Mortenson, Thomas G., and Wu, Zhijun, "High School Graduation and College Participation of Young Adults by Family Income Backgrounds 1970 to 1989" (1990)	HSB, Current Population Report, CPS

STUDY	MAIN DATA SOURCES
National Center for Education Statistics. "Confronting the Odds: Students At Risk and the Pipeline to Higher Education" (1997).	NELS
Orfield, Gary, "Money, Equity, and College Access" (1992)	Review of history of federal student financial aid programs
Reyes, Suzanne, "The College Enrollment Decision: The Role of the Guaranteed Student Loan" (1994)	NLSY, HSB
Rouse, Cecilia Elena, "What to Do after High School: The Two-Year versus Four-Year College Enrollment Decision" (1994)	NLSY, HSB, CPS
St. John, Edward P., and Noell, Jay, "The Effects of Student Financial Aid on Access to Higher Education: An Analysis of Progress with Special Consideration of Minority Enrollment" (1989)	NLS72, HSB
St. John, Edward P., "Price Response in Enrollment Decisions: An Analysis of the High School and Beyond Sophomore Cohort" (1990)	HSB
Savoca, Elizabeth, "Another Look at the Demand for Higher Education: Measuring the Price Sensitivity of the Decision to Apply to College" (1990)	NLS72
Schwartz, J. Brad, "Student Financial Aid and the College Enrollment Decision: The Effects of Public and Private Grants and Interest Subsidies" (1985)	HSB, CPS
Schwartz, J. Brad, "Wealth Neutrality in Higher Education: The Effects of Student Grants" (1986)	HSB, CPS

III. DATA

A. NELS DATA

While a number of studies have used data from the National Longitudinal Survey, Youth Cohort (NLSY), the National Longitudinal Study of the High School Class of 1972 (NLS72), and the High School and Beyond Survey (HSB) to examine the factors affecting college enrollments, this work effort is among the first to use NELS to analyze these types of issues. In 1988, NELS initially surveyed over 24,000 public and private school eighth graders throughout the United States. The nationally representative eighth grade cohort was tested in four subjects (mathematics, reading, science, and social studies). Two teachers of each student (representing two of the four subjects) were also surveyed, as was an administrator from each school. On average, each of the 1,052 participating schools was represented by 24 students and five teachers. Parents were also surveyed, providing researchers with detailed information on family background variables.

Since 1988, the initial eighth grade cohort has been re-surveyed three times (and has been "freshened" with new sample members). The first follow-up of NELS (spring, 1990), included the same components as the base year study, with the exception of the parent survey, which was not implemented in the 1990 round. It also included a component on early dropouts (those who left school between the end of eighth grade and the end of 10th grade). The second follow-up (spring, 1992), repeated all components of the first follow-up study and also included a parent questionnaire. However, this time only one teacher of each student (either a mathematics or a science teacher) was asked to complete a teacher questionnaire. High school transcript data were also collected for these students.

A subsample of the NELS:88 second follow-up sample was again followed-up in the spring of 1994, when most sample members had been out of high school for 2 years. In all, 14,915 students were surveyed, most through computer-assisted telephone interviewing. Major content areas for the third follow-up questionnaire were: education histories; work experience histories; work-related training; family formation; opinions and other experiences; occurrence or

non-occurrence of significant life events; and income. Data collection for this wave began on February 4, and ended on August 13, 1994. At the time the data were collected, most of the respondents were 2 years out of high school. Table 2 summarizes the components of the different waves of the surveys.

Table 2

OVERVIEW OF NELS

NELS Components	Base Year Spring term 1988	First Follow-up Spring term 1990	Second Follow-up Spring term 1992	Third Follow-up Spring 1994
Grades included	grade 8	modal grade = sophomore	modal grade = senior	H.S. + 2 years
Cohort	students: questionnaire, tests	students, dropouts: questionnaire, tests	students, dropouts: questionnaire, tests, H.S. transcripts	all individuals: questionnaire
Parents	questionnaire	none	questionnaire	none
Principals	questionnaire	questionnaire	questionnaire	none
Teachers	two teachers per student (taken from reading, mathematics, science, or social studies)	two teachers per student (taken from reading, mathematics, science, or social studies)	one teacher per student (taken from mathematics or science)	none

B. NPSAS DATA

Because the NELS database does not contain detailed information on financial aid, the National Postsecondary Student Aid Study (NPSAS) database is used to supplement our study with additional financial aid information. This database is used to predict financial aid for the respondents in NELS based on demographic and other characteristics that are available in both databases. NPSAS is constructed specifically to provide information on financing of post-secondary education, so it is a good candidate for this use. This database surveys a nationally representative sample of undergraduate, graduate, and first-professional students attending less than 2-year, 2-year, 4-year, and doctoral granting institutions. Both students who receive and those who do not receive financial aid are surveyed.

The 1993 NPSAS study collected information on more than 78,000 undergraduate and graduate students at about 1,100 institutions. To be eligible, students must have been enrolled between May 1, 1992 and April 30, 1993 at a postsecondary institution in the United States or Puerto Rico. The students had to be enrolled in courses for credit, and in a program of 3 months or longer. Also eligible for inclusion were students who received a bachelor's degree between July 1, 1992 and June 30, 1993. Students who were enrolled in a GED program or who were also enrolled in high school were not included.

C. SAMPLE AND WEIGHTS

Of the 14,915 respondents in the third NELS follow-up, 13,120 are represented in all four waves of the NELS data. The remaining 1,795 respondents are either first follow-up "freshened" students,[4] second follow-up freshened students,[5] base-year ineligibles,[6] or base-year eligible students who declined to participate in one or more of the survey waves, but who did participate in the third survey wave. The breakdown of these 1,795 respondents is as follows: 501 first follow-up freshened students, 102 second follow-up freshened students, 271 base-year ineligibles, and 921 base-year eligibles with missing survey waves.

To take advantage of the longitudinal nature of the NELS data and to be consistent across models and issues in the report, we focus our work on the sample of 13,120 respondents represented in all four waves of the NELS data. Consequently, the weight used in our analyses, ("F3PNLWT") applies to sample members who completed questionnaires in all four rounds of NELS:88. *As a result, the longitudinal analyses that we conduct, and the estimates that are produced in this study can only be used to make projections to the population of spring 1988 eighth graders.* In the descriptive tables, all percentages are weighted using F3PNLWT, including the analyses with the high school transcript data.

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[4]Those who were tenth graders in 1990 but were not in the base-year sampling frame, either because they were not in the country or because they were not in the eighth grade in the spring term of 1988.

[5]Those who were 12th graders in 1992 but were not in either the base year or first follow-up sampling frames, either because they were not in the country or because they were not in the eighth (10th) grade in the spring term of 1988 (1990).

[6]Students excluded in 1988 due to linguistic, mental, or physical obstacles to participation.

This sample includes dropouts, since the purpose of this study is to examine the overall question of what characteristics of eighth graders in 1988 are related to PSE attendance. We focus on early indicators, such as educational expectations and course-taking behavior in the eighth grade, and not on the "pipeline" of high school experiences that a dropout would lack access to. However, the dropouts were not asked the same set of survey questions as the other respondents, and, therefore, some of the analysis does not include dropouts. For each of our tables or figures, we note whether or not the dropouts are included in the analysis.

D. CORRECTED STANDARD ERRORS

Because NELS data are collected through a multi-stage sampling scheme, calculation of standard errors through standard methods can understate these errors. The sampling technique used in NELS is a selection of schools, and then within schools, a selection of students. With this sampling method, the observations of different students may not be independent from one another. Stata™, the statistical software used for analysis in this report, corrects the standard errors for these sampling techniques. Except for multinomial logit models, for which this correction is not available, survey correction techniques are used, and we note whenever the corrections are not used. However, we have found that such corrections do not have a large effect on our results, and therefore, we present all results with confidence.

E. VARIABLE DEFINITIONS

The appendix to this study contains definitions of the key variables used in our analysis. For each key variable, we describe how we constructed the variable and we list the names of the NELS variables used in the construction.

IV. WHO GOES TO COLLEGE?

A. WHAT PROPORTION OF STUDENTS ATTEND COLLEGE, AND WHAT TYPE OF COLLEGE DID THEY ATTEND?

We begin our analysis by examining the demographics of postsecondary school choice and discussing our main findings regarding college attendance rates and types of postsecondary education (PSE) attended. As shown in Table 3, a majority of 1988 eighth graders attend some type of PSE by 1994. Overall, 62.7 percent of the respondents attend PSE. (Note that in all of the tables in this report, all percentages are weighted.)

Students are most likely to attend a 4-year public or a less than 4-year public school. Approximately 24 percent of the students attend each of these types of schools. Next most common are 4-year private schools. Just over 11 percent of the respondents attend 4-year private schools. Only 4 percent of the respondents attend less than 4-year private schools. Thirty-seven percent of the respondents do not attend any type of PSE.

Women are slightly more likely than men to attend PSE. While 60 percent of men attend PSE, 65 percent of women attend. Women are more likely than men to attend 4-year private schools and less than 4-year private schools.

Native Americans, Blacks, and Hispanics are least likely to attend PSE and Asians and Pacific Islanders are most likely to attend PSE. Hispanics are most likely to attend less than 4-year private schools.

Students whose parents have higher education levels are much more likely to attend PSE. While only 33 percent of students whose parents have less than a high school education attend PSE, 90 percent of students whose parents have an advanced degree attend PSE.

Table 3

DEMOGRAPHICS OF POSTSECONDARY SCHOOL CHOICE[1]

		No PSE	4-Year Public	4-Year Private	<4-Year Public	<4-Year Private[2]
All observations (weighted distribution)		37.3	24.0	11.1	23.7	4.0
By Sex						
male[3]	(50.1)	40.0	23.6	9.7	23.8	2.9
female	(49.9)	34.7	24.3	12.4	23.6	5.0
By Race						
Asian/ Pacific Islander	(3.5)	21.0	29.8	17.6	27.5	4.1
Hispanic	(10.3)	47.1	16.1	5.7	25.1	5.9
Black	(13.3)	48.0	20.4	7.7	18.9	5.0
White	(71.4)	34.2	25.8	12.3	24.2	3.5
Native American	(1.4)	62.2	10.1	3.6	22.0	2.2
By Parents' Highest Education						
< high school	(10.8)	66.6	8.5	2.7	15.7	6.6
high school diploma or GED	(20.3)	55.8	13.1	5.0	22.9	3.2
some college	(41.2)	38.2	22.9	8.2	26.7	4.1
4-year college graduate	(14.5)	13.3	40.5	18.9	23.6	3.7
advanced degree	(13.2)	9.6	39.7	30.4	17.8	2.6
By Region						
northeast	(19.3)	27.9	26.1	24.0	17.3	4.6
midwest	(25.7)	35.6	28.0	10.6	21.6	4.2
south	(35.7)	40.2	24.8	7.3	24.2	3.4
west	(19.4)	36.1	19.3	8.1	32.4	4.1
By Urbanization						
urban	(28.4)	34.3	24.9	13.8	23.0	4.0
suburban	(40.5)	31.7	25.7	12.3	25.7	4.5
rural	(31.1)	42.5	23.7	8.5	22.1	3.3

[1] This analysis includes high school dropouts.

[2] Private schools less than 4-years include private for profit schools.

[3] An example of the way this table should be read is that 40 percent of males who were eighth graders in 1988 do not go to PSE by 1994, 23.6 percent of males go to a 4-year public college, 9.7 percent of males go to a 4-year private college, 23.8 percent of males go to less than 4-year public school, and 2.9 percent of males go to a less than 4-year private school. Rows sum to 100 percent (approximately because of rounding). In addition, 50.1 percent of our sample is male and 49.9 percent is female.

B. HOW ARE INCOME AND TEST SCORE RELATED TO WHO GOES TO COLLEGE?

This section first describes how we divided the NELS sample into income and test score groups, and then describes how income and test score are related to who goes to college.

Family income level is defined using total family income, as provided by the parents in the base-year and second follow-up questionnaires. We divided the family income levels in the base year into bottom, middle, and top groups. Since family income is only available in ranges, and not as exact amounts, we were unable to divide the sample into three groups of equal size. Rather, the low income, middle income, and high income groups represent 38 percent, 39 percent and 23 percent of our sample, respectively.

When the base-year family income was not available, students were placed according to second follow-up family income ranking.[7] The rationale for this method was to ensure a sufficient number of observations in the low income group. Since the income groups are only used to assign a respondent to one of the three groups, and are *not* used to assign an actual dollar amount of family income, this approach is reasonable. Further, we found that, for those with both data points of family income, a person in a given income group in the base year was most likely to be in the same income group in the second follow-up year.

As a proxy measure of ability, we used the composite reading/math test score administered in each wave of the survey.[8] We divided the scores from the base year into bottom, middle, and top groups, with approximately one-third of the students in each category. If the base-year test score was not available, then students were placed according to their ranking in the first follow-up test, and if both the base-year test and the first follow-up test were missing, then

[7] We tested three other definitions of low income, besides the bottom third: bottom fourth of income distribution; family income below 150 percent of the poverty threshold; and family income below the Pell grant maximum eligibility level. Using these alternative definitions, the percentage asigned to the low income, high test score group did not vary significantly. For example, the (weighted) percentage of low income, high test score students attending PSE ranged from 70 to 72 percent and the percentage attending a 4-year institution ranged from 45 to 47 percent.

[8] This test is described in the Appendix.

students were placed according to their ranking in the second follow-up test. Again, the rationale for this method is to ensure a reasonable number of observations, and is only used to assign a person to one of the three groups. As with income, test scores for an individual are highly correlated across the survey waves. A person in a given test score group in the base year is most likely to be in the same test score group in the first and second follow-ups.

Table 4 and Figure 1 depict key points regarding the relationship among income, test score, and PSE attendance for all 1988 eighth graders, including dropouts. We find that individuals with the lowest test scores are least likely to attend PSE. While 38 percent of the lowest test score group attends PSE, 63 percent of the middle test score group attends PSE and 87 percent of the highest test score group attends PSE. PSE attendance also increases with family income. Nearly 44 percent of the bottom family income group attends PSE, 69 percent of the middle income group attends PSE, and 86 percent of the top income group attends PSE.

When we examine only the high test score students, income differences are greatly reduced but are not eliminated. Of those in the top test group, 75 percent of the low income group attend PSE. This compares with 86 percent of those in the middle income, top test score group and 95 percent in the top income, top test score group. However, the low income, high test score individuals do attend PSE at a higher rate than the high income, low test score individuals (75 percent versus 64 percent).

Income effects tend to diminish in magnitude as test scores increase. For example, within the bottom test group, the difference in PSE attendance rates for low income and high income individuals is 35 percent (29 percent versus 64 percent). This contrasts with the 20 percent difference in PSE attendance rates for low income and high income individuals within the top test group, (75 percent versus 95 percent).

Table 4

POSTSECONDARY SCHOOL CHOICE, BY INCOME AND TEST SCORE[1]

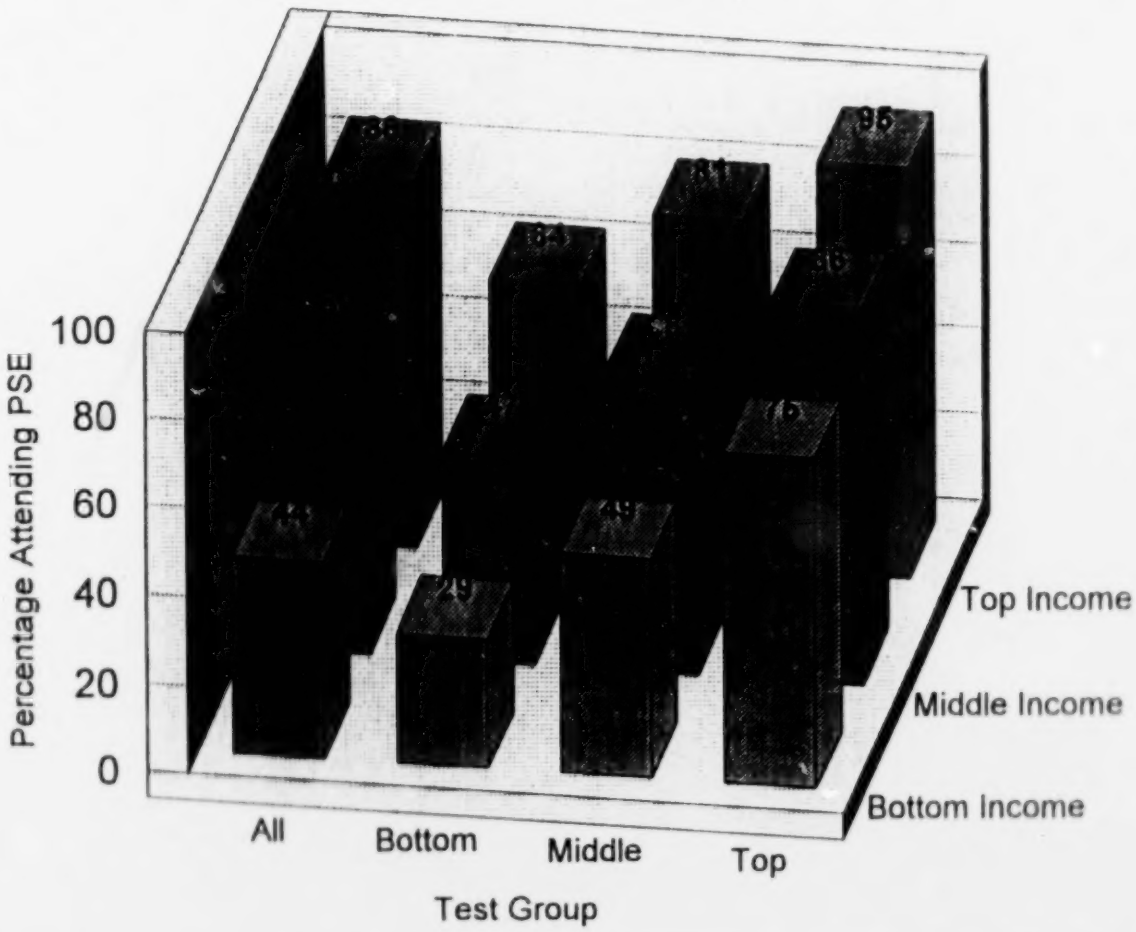
		No PSE	4-Year Public	4-Year Private	<4 Year Public	<4 Year Private
All observations (weighted distribution)		37.3	24.0	11.1	23.7	4.0
By Test Score						
bottom[2]	(33.8)	61.7	8.8	2.8	21.9	4.8
middle	(33.4)	36.6	21.9	8.2	28.8	4.5
top	(32.8)	13.0	41.6	22.4	20.5	2.5
By Family Income Level						
bottom	(38.4)	56.1	14.5	5.3	19.6	4.5
middle	(38.8)	31.2	25.6	10.9	28.3	4.1
top	(22.8)	14.4	38.1	21.5	23.2	2.9
By Test Score and Family Income						
bottom test, bottom income	(18.8)	70.9	6.7	1.6	16.1	4.8
bottom test, middle income	(10.8)	53.4	10.8	4.1	26.8	4.8
bottom test, top income	(3.8)	36.4	15.8	4.8	38.3	4.8
middle test, bottom income	(12.9)	50.6	15.9	5.6	23.5	4.4
middle test, middle income	(13.9)	31.9	21.8	7.4	34.2	4.7
middle test, top income	(6.7)	19.2	33.1	15.0	28.4	4.3
top test, bottom income	(6.8)	25.3	33.7	14.9	22.4	3.7
top test, middle income	(14.2)	13.9	40.3	19.4	23.5	2.9
top test, top income	(12.2)	4.8	47.7	30.1	15.9	1.6

[1] Dropouts are included.

[2] An example of how to read this table is that 61.7 percent of those 1988 eighth graders who were in the bottom test score group do not attend PSE, 8.8 percent attend a 4-year public college, 2.8 percent attend a 4-year private college, 21.9 percent attend a less than 4-year public school, and 4.8 percent attend a less than 4-year private schools. Rows sum to 100 percent (approximately because of rounding). In addition, 33.8 percent of our sample is in the bottom test score group.

Figure 1

Percentage of 1988 Eighth Graders Attending PSE by 1994



C. HOW ARE INCOME AND ABILITY RELATED TO THE TYPE OF PSE ATTENDED?

Figure 2 examines PSE attendance at 4-year schools for those students who attend PSE. As shown, for those in PSE, low income students are less likely to attend 4-year schools than higher income students, even among high test score students. While 65 percent of those individuals in the bottom income, top test score group who attend PSE attend a 4-year college, 69 percent of those in the middle income, top test score group and 82 percent of those in the top income, top test score group attend a 4-year college. Thus, controlling for test score, low income students are less likely to attend 4-year schools than higher income students.

For those in PSE, low income students are disproportionately found in public institutions relative to higher income students, even within the group of high test score students. Further examination of Table 4 shows that while 31 percent of low income, high test score students who attend 4-year institutions attend private schools; 39 percent of high income, high test score students attend private schools.

D. WHAT POST HIGH SCHOOL ACTIVITIES ARE STUDENTS INVOLVED IN?

Next we examine educational and other activities that students engage in after high school by income and test score groups. Table 5 describes the full range of activities a respondent might be involved in after high school.[9]

Students in the bottom income, top test score group are most commonly combining work and academic courses 2 years after they would be expected to have graduated from high school. The same is true of the respondents in the middle income, top test score group. This compares with students in the top income, top test score group, who are most likely to be taking academic courses and not working. Relative to the top income, top test score group, the bottom and

[9]Here we examine activities that students engage in 2 years after the normal high school graduation rate regardless of whether they graduated from high school at the normal time. As such, dropouts are included in the table.

Figure 2

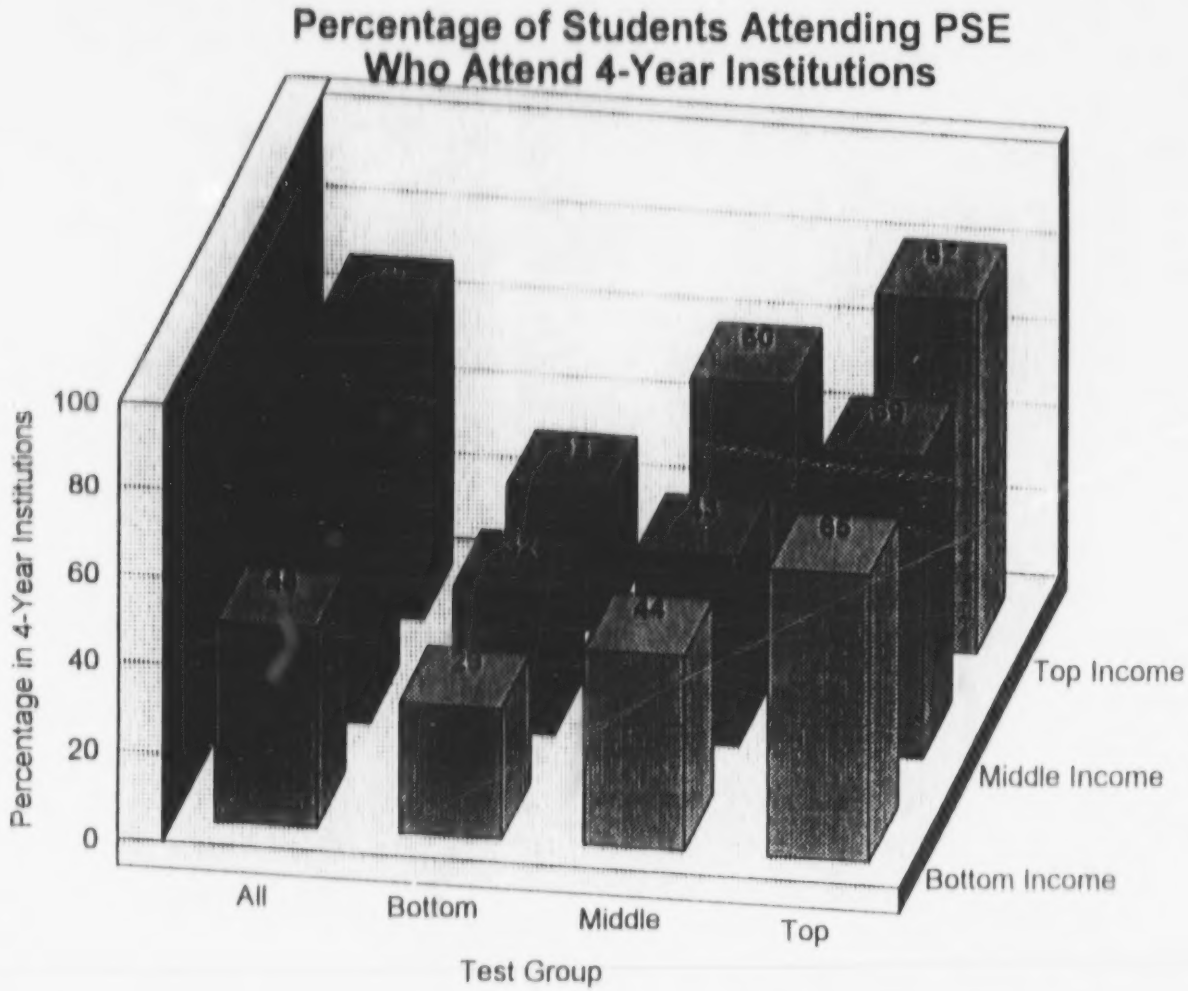

Percentage of Students Attending PSE
Who Attend 4-Year Institutions
Percentage in 4-Year Institutions
100
80
60
40
20
0
All
Bottom
Middle
Top
Test Group
Top Income
Middle Income
Bottom Income

Table 5

POST HIGH SCHOOL ACTIVITIES, BY INCOME AND TEST SCORE[1]

	Bottom Family Income			Middle Family Income			Top Family Income		
	Bottom test score	Middle test score	Top test score	Bottom test score	Middle test score	Top test score	Bottom test score	Middle test score	Top test score
Work and academic courses	9.2	18.9	36.4	17.8	29.8	38.4	31.1	30.9	34.6
Work and vocational courses	3.0	3.7	2.2	4.8	4.4	1.8	2.2	3.3	1.2
Work and no school[2]	48.6	43.9	24.8	48.5	31.6	20.5	37.5	19.3	9.6
Academic courses and no work	5.8	10.7	19.3	8.5	16.5	28.2	11.2	28.9	45.2
Vocational courses and no work	1.9	1.5	1.0	1.8	1.8	0.5	3.2	2.4	0.3
Academic courses and looking for work	0.8	2.0	2.0	1.5	3.2	2.5	0.9	3.7	3.3
Vocational courses and looking for work	1.5	0.3	0.1	0.8	0.3	0.3	0.0	0.0	0.0
Looking for work and no school	12.8	7.3	4.3	6.3	4.3	1.9	4.0	5.4	1.7
Military and academic or vocational courses	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.1	1.0
Military and work	0.6	1.3	1.3	0.7	1.4	0.5	0.6	0.9	0.6
Military only	1.3	2.8	3.9	1.6	2.8	1.8	0.6	1.5	0.3
Training and academic or vocational courses	0.4	0.0	0.4	0.1	0.1	0.3	0.6	0.2	0.2
Training only	0.5	0.2	0.0	0.2	0.1	0.1	0.0	0.0	0.1
Keeping house only	7.9	4.1	2.1	4.8	2.8	1.6	3.8	1.3	0.6
Other	5.9	3.3	2.2	2.5	0.8	1.6	4.3	2.2	1.3

[1] Dropouts are included in this analysis.

[2] An example of how to read this table is that 48.6 percent of bottom income, bottom test score respondents reported that they worked, 43.9 percent of bottom income, middle test score respondents reported that they worked, 24.8 percent of bottom income, top test score respondents reported that they worked, 48.5 percent of middle income, bottom test score respondents reported that they worked, 31.6 percent of middle income, middle test score respondents reported that they worked, 20.5 percent of middle income, top test score respondents reported that they worked, 37.5 percent of top income, bottom test score respondents reported that they worked, 19.3 percent of top income, middle test score respondents reported that they worked, and 9.6 percent of top income, top test score respondents reported that they worked. Columns sum to 100 percent (approximately due to rounding).

middle income, top test score groups are more likely to be working and not attending PSE (25 percent and 21 percent compared to 10 percent for the high income, high test score group). This suggests that forgone earnings may be a bigger factor affecting the enrollment decision of lower and middle income students, even high test score students who likely could succeed in college.

Those in the bottom income, top test score group are the most likely to enter the armed forces. While 4 percent of those in the bottom income, top test score group are in the "military only" category, 2 percent of those in the middle income, top test score group, and less than 1 percent of those in the top income, top test score group are in this category. This indicates that a small fraction of lower income students choose to enter the military as an alternative to PSE, perhaps because of lack of financial resources.

V. FACTORS RELATED TO PSE ATTENDANCE

This section discusses factors related to PSE attendance. After describing the reasons students give for not planning to attend PSE, we describe factors related to PSE attendance. We then report the associated results from multivariate logit models.

A. WHAT ARE THE REASONS STUDENTS GIVE FOR NOT PLANNING TO ATTEND PSE?

One of the important goals of this study is to determine the factors that are related to PSE attendance, especially for low income students. Although self-reported reasons why individuals do not plan to attend PSE can be problematic since people will tend to put the "best" face on whatever decision they made, they do provide some indication of students' reasoning in their education choices. Table 6 explores reasons why respondents do not plan to attend PSE by income and test score, for those students who do not plan to continue their education immediately after high school. The table does not include high school dropouts, as they were not asked these questions.

All of the groups of students are most likely to report that they do not plan to attend PSE because they plan to take off time before continuing their education. The non-financial reasons for not planning to attend PSE are similar across the income spectrum.

The gaps across income groups are much larger for the financial reasons. As expected, low income students are more likely than higher income students to report that they cannot afford school and that they have to support their family. Of those students who say they do not plan to attend PSE immediately after high school, 57 percent of bottom income, top test score students report that it is because they cannot afford to attend, 38 percent of the middle income, top test students give this reason and 21 percent of the top income, top test score students give this reason. Likewise, over 19 percent of the bottom income, top test score students state that they do not plan to attend PSE because they have to support their family, as compared to 11 percent of

Table 6

REASONS RESPONDENTS DID NOT PLAN TO ATTEND PSE, BY INCOME AND TEST SCORE[1]

Reasons Respondents Do not Plan to Attend PSE	Bottom Family Income			Middle Family Income			Top Family Income		
	Bottom test score	Middle test score	Top test score	Bottom test score	Middle test score	Top test score	Bottom test score	Middle test score	Top test score
Percentage not planning to continue education right after high school	40.1	30.7	16.0	31.6	21.8	11.7	25.5	14.7	4.3
Cannot afford school	49.7	49.2	57.2	45.0	42.5	37.7	27.8	37.8	21.2
Has to support family	26.7	18.7	19.3	15.4	12.3	10.7	14.1	15.6	0.6
Does not like school[2]	29.5	31.5	32.2	33.2	30.6	36.6	40.5	30.8	43.2
Grades not good enough	37.0	29.9	28.8	34.4	23.4	13.5	29.4	19.6	21.6
Test scores too low	17.3	7.3	7.9	13.3	9.4	2.8	13.7	5.8	6.2
Will not need more school for job	27.6	15.9	13.3	23.8	14.6	13.1	20.4	11.6	9.6
Not accepted to schools applied to	10.5	1.9	6.9	6.8	3.9	2.9	9.0	2.3	2.1
Has not taken the right courses	25.1	15.0	10.8	19.8	11.9	7.4	18.7	12.7	9.1
No one in the family has gone to college	23.1	14.8	13.9	13.3	9.1	7.7	7.8	5.1	2.5
Plans to take off time before school	64.4	68.4	78.5	62.5	72.4	78.3	54.4	76.1	69.5
Would rather work and earn money	47.9	37.4	42.9	43.4	45.4	38.3	36.9	24.2	40.6
Plans to be full-time homemaker	8.4	4.6	3.9	5.0	4.5	6.4	5.1	1.6	7.5
Does not think school is important	16.2	7.1	11.1	16.2	12.3	9.8	15.7	7.2	15.8
Teacher recommended work	9.8	3.8	4.3	6.8	2.4	2.2	6.5	4.2	0

[1] This analysis does not include high school dropouts, as they were not asked these questions.

[2] An example of how to read this table is that 29.5 percent of bottom income, bottom test score respondents who do not plan to attend PSE immediately after high school say it is because they do not like school, 31.5 of bottom income, middle test score respondents give this reason and 32.2 percent of bottom income, top test score respondents give this reason.

the middle income, top test score group and less than 1 percent of the top income, top test score group.[10] In short, low income students are more likely to put off their education, and they are more likely to report a lack of financial resources as the cause.

B. WHAT FACTORS ARE ASSOCIATED WITH A GREATER LIKELIHOOD OF ATTENDING PSE?

In addition to demographics, discussed in Section IV, we expect the following four general factors to be related to PSE attendance:

- Academic preparation (e.g., high school program)
- Course-taking behavior
- Educational expectations
- Behavioral variables

The beginning of this section describes data on these four areas, and the second half presents results of multivariate models that contain variables from all of these areas, as well as demographic data.

B1. What Is the Relationship between Academic Preparation and PSE Attendance?

The type of high school program an individual participates in is expected to be correlated with whether he or she attends PSE. Table 7 examines high school program and PSE attendance by income. As expected, those in rigorous academic programs are more likely to attend PSE.[11] Even among low income students, almost 90 percent who took a rigorous academic program went to PSE. Although the differences by income are fairly small when controlling for high school program type, this is a lower rate of participation than for higher income students taking a rigorous academic program. For example, 87.5 percent of the bottom income students in the rigorous academic program attend PSE, as compared with 93 percent of the middle income students and

[10]Of both low and middle income students who said that they did not plan to attend PSE because they had to support their family, 65 percent were working and not attending PSE 2 years after high school.

[11]Rigorous high school programs are defined by the courses taken, as shown in the high school transcript. Students who take at least 4 units of English, 3 units of social studies, 3 units of science, 3 units of math, 5 units of computer science, and 2 units of foreign languages are defined to be in a rigorous academic track.

Table 7

TYPE OF HIGH SCHOOL PROGRAM AND POSTSECONDARY EDUCATION ATTENDANCE BY FAMILY INCOME[1]

High School Program	% in each program[3]	Low Income					Middle Income					High Income				
		No PSE	4-Yr public	4-Yr private	<4-Yr public	<4-Yr private[2]	No PSE	4-Yr public	4-Yr private	<4-Yr public	<4-Yr private	No PSE	4-Yr public	4-Yr private	<4-Yr public	<4-Yr private
Rigorous academic	18.2	12.5	45.4	16.8	21.4	3.9	7.0	47.0	21.0	20.6	4.4	3.6	52.4	28.7	14.9	0.4
Academic	43.7	33.9	24.0	6.9	30.1	5.2	19.5	31.3	12.9	32.7	3.6	6.5	38.1	25.0	27.1	3.3
Vocational	5.2	73.7	2.5	2.5	15.5	6.0	61.7	3.5	1.2	29.2	4.3	58.7	6.4	4.7	27.1	3.1
Academic/ vocational	6.2	55.7	9.5	3.4	23.6	7.8	32.8	16.6	3.4	41.5	5.7	31.0	22.7	8.6	35.2	2.5
None of the above	26.0	80.1	3.2	1.2	11.9	3.6	61.1	6.4	2.4	24.5	5.7	41.0	19.5	5.2	29.8	4.4

[1] While this analysis does include dropouts, almost all of the dropouts were in the "none of the above" category.
[2] The less than 4-year private category includes private for profit schools with an unspecified time length.
[3] Additionally, 0.7 were classified to be in vocational and rigorous academic.

96.4 percent of the top income students. Likewise, controlling for being in the rigorous academic program, the low income students are less likely to attend a 4-year institution, and are more likely to attend a less than 4-year school than their higher income counterparts.

B2. What Is the Relationship between Course-Taking Behavior and PSE Attendance?

Above we found that the type of high school program a student is enrolled in is related to PSE attendance. Here we examine the relationship between individual courses taken and PSE attendance.

Table 8 examines high school courses and PSE attendance by family income. Individuals in the top family income group are more likely than those in lower income groups to take the math and science courses associated with PSE attendance. These courses include calculus, pre-calculus, algebra, geometry, physics, chemistry, and biology. For example, only 46 percent of low income students took geometry in high school, while 69 percent of middle income students and 82 percent of high income students did.[12]

There is also evidence that students who take advanced math and science courses are more likely to go to college. For example, 76 percent of low income students who took algebra II in high school went on to college, while only 32 percent of low income students who did not take algebra II went to college.

While the relationship between taking advanced courses and PSE attendance is strong for all students, the correlation appears to be greater for lower income students. For example, taking chemistry in high school is associated with a greater likelihood that a student will go to college. The difference in the rate of college-going between those who do and do not take chemistry in high school is greater for low income students (79 percent versus 31 percent) than for middle income students (89 percent versus 50 percent) or high income students (95 percent versus 68 percent).

[12] This analysis includes dropouts who may have left high school before they had the opportunity to take some of these courses.

Table 8

HIGH SCHOOL CURRICULUM AND POSTSECONDARY EDUCATION ATTENDANCE BY FAMILY INCOME[1]

Type of Courses	Was course taken?	Family Income					
		Bottom		Middle		Top	
		% Taking course	% Who attend PSE	% Taking course	% Who attend PSE	% Taking course	% Who attend PSE
Calculus[2]	Yes	4.6	93.8	9.1	93.5	17.7	99.4
	No	95.4	44.5	90.9	68.3	82.3	84.8
Pre-calculus	Yes	7.1	91.9	14.5	94.9	25.8	98.2
	No	92.9	43.4	85.6	66.5	74.2	83.6
Algebra 1[3]	Yes	77.8	58.0	88.8	75.0	93.8	90.5
	No	22.2	15.4	11.2	41.1	6.2	50.4
Algebra 2	Yes	34.0	75.9	51.3	85.5	62.1	94.7
	No	66.0	31.9	48.7	54.9	37.9	75.3
Geometry	Yes	46.2	70.7	69.1	83.6	81.6	93.9
	No	53.9	26.4	30.9	41.6	18.4	58.5
Physics	Yes	12.9	83.5	23.0	91.4	38.0	97.6
	No	87.1	41.4	77.0	64.4	62.0	81.1
Chemistry	Yes	33.3	79.2	52.2	89.1	71.6	95.1
	No	66.7	30.7	47.8	50.4	28.4	67.8
Biology	Yes	81.1	53.9	89.3	74.3	94.9	89.1
	No	19.0	16.5	10.7	40.0	5.1	54.4
Foreign language	Yes	52.4	67.5	71.8	81.2	85.9	93.3
	No	47.6	24.1	28.2	43.7	14.1	51.2
Vocational	Yes	26.8	47.1	25.1	65.7	18.2	81.5
	No	73.3	46.7	74.9	72.3	81.8	88.7
Technical	Yes	1.2	48.7	1.7	83.8	1.7	92.6
	No	98.8	46.8	98.3	70.4	98.3	87.3
Basic skills	Yes	22.4	46.0	19.9	66.1	15.2	83.1
	No	77.6	47.1	80.1	71.7	84.8	88.1

[1] This analysis includes dropouts.

[2] An example of how to read this table is that 4.6 percent of the bottom income group of students who were eighth graders in 1988 take calculus. Of those students in the bottom income group who take calculus, 93.8 percent attend PSE. Of those students in the bottom income group who do not take calculus, 44.5 percent attend PSE.

[3] Algebra 1 includes students who took the course in eighth grade (as self-reported) or in high school (as reported in their transcript).

Even when course-taking patterns are accounted for, income effects on PSE attendance remain. For example, within the group of all students who take geometry, higher income students are more likely to attend PSE than middle income students (94 percent versus 84 percent) or low income students (94 percent versus 71 percent).

The previous analysis showed that courses taken in high school are strongly related to the probability of attending PSE. Here we examine the relationship between courses attended in eighth grade and PSE attendance, as these courses lay groundwork for courses that can be taken in high school.

Table 9 examines classes attended at least once per week by eighth graders and PSE attendance, by family income. Students who take algebra I or who take science laboratory at least once a week in eighth grade are more likely to attend PSE than those who do not, and individuals with higher income are more likely to be taking these courses. The relationship between taking algebra I in the eighth grade and attending PSE is greater for the low income students than for middle or high income students. (But low income students are less likely to take algebra 1 in the eighth grade.) The rate of college attendance is 20 percentage points higher for low income students who take algebra I as compared to those who do not (61 percent as compared to 40 percent) compared to only 15 percentage points for middle income students (78 percent as compared to 64 percent) and 10 percentage points for high income students (91 percent as compared to 81 percent). However, even accounting for the course-taking behavior of eighth graders, income effects remain. The high income students who take algebra are more likely than the low income students who take algebra to attend PSE. While 61 percent of the low income students who take algebra attend PSE, 78 percent of the middle income students who take algebra attend PSE, and 91 percent of the top income students who take algebra attend PSE.

B3. What Is the Relationship between Educational Expectations and PSE Attendance?

Educational expectations, which are formed early in the school experience, are highly correlated with PSE attendance. Table 10A explores educational expectations in eighth grade and PSE attendance associated with those expectations. Over 65 percent of eighth graders

Table 9

CLASSES REPORTED TO BE ATTENDED AT LEAST ONCE PER WEEK BY EIGHTH GRADERS AND PSE ATTENDANCE BY FAMILY INCOME[1]

Type of Course	Was course taken?	Family Income					
		Bottom		Middle		Top	
		% of Students	% Who attend PSE	% of Students	% Who attend PSE	% of Students	% Who attend PSE
Remedial math[2]	Yes	9.7	27.0	6.3	58.3	6.1	73.1
	No	90.3	47.0	93.7	69.9	93.9	86.9
Regular math	Yes	76.4	41.1	67.1	66.2	53.6	82.1
	No	23.6	54.3	32.9	75.3	46.4	90.3
Algebra 1[3]	Yes	28.6	61.3	39.2	78.4	54.3	90.7
	No	71.4	39.6	60.8	63.5	45.7	80.9
Science laboratory	Yes	24.0	50.8	29.7	72.2	37.7	90.5
	No	76.0	44.4	70.3	67.8	62.3	83.7
Science	Yes	60.4	43.3	60.6	67.9	59.4	84.2
	No	39.6	46.6	39.4	71.1	40.6	88.6
Biology	Yes	18.1	47.6	19.8	67.4	19.0	88.1
	No	81.9	45.2	80.3	69.9	81.0	85.8
Earth science	Yes	54.3	44.8	50.3	69.6	47.6	87.5
	No	45.7	46.0	49.7	69.5	52.4	85.1

[1] This analysis includes dropouts.

[2] An example of how to read this table is that 9.7 percent of the bottom income students take remedial math. Of those students in the bottom income group who take remedial math, 27 percent attend PSE.

[3] Numbers for regular math, remedial math, and algebra do not sum to 100 because some students take more than one type of math.

expected to complete at least a bachelor's degree while an additional 13 percent expected to attend college. The higher one's educational expectations, the more likely one is to attend PSE. While 19 percent of eighth graders who expect to just graduate high school actually attend PSE, 73 percent of those who in eighth grade expect to obtain a bachelor's degree attend college, and 83 percent of those who expect to obtain a master's degree or higher attend college.[13]

[13]There is also a slight decline in expectations over time. In the eighth grade, 43 percent expected to receive a bachelor's degree (and 23 percent a master's degree or higher), while in the 12th grade (not shown in table), 32 percent were expecting to receive a bachelor's degree (and 30 percent a master's degree or higher).

Table 10B examines eighth grade educational expectations and PSE attendance by income. Students with higher family income expect higher levels of educational attainment. While 51 percent of those in the bottom income group expect to complete a bachelor's degree or higher, 69 percent in the middle income group and 85 percent in the top income group expect to complete a bachelor's degree or higher. Even among those students who expect to complete a bachelor's degree, high income students are more likely to attend PSE than are low income students. While 58 percent of bottom income students who expect to complete a bachelor's degree attend PSE, 75 percent of middle income and 90 percent of top income students who expect to complete a bachelor's degree attend PSE.

Table 10A

EIGHTH GRADE EDUCATIONAL EXPECTATIONS AND PSE ATTENDANCE[1]

	%	% Attending PSE
Less than high school	1.5	20.9
High school graduate	10.4	19.4
Trade school	9.2	36.5
Some college	13.2	51.4
Bachelor's degree	43.1	73.4
Master's degree or higher	22.6	83.1

[1] This analysis includes dropouts.

Table 10B

EIGHTH GRADE EDUCATIONAL EXPECTATIONS AND PSE ATTENDANCE BY INCOME[1]

	Bottom Income		Middle Income		Top Income	
	%	% Attending PSE	%	% Attending PSE	%	% Attending PSE
Less than high school	2.2	13.3	1.0	48.8	1.2	*
High school graduate	16.9	15.6	7.6	26.7	3.8	31.1
Trade school	13.1	27.7	8.9	46.5	3.3	53.4
Some college	16.8	42.7	13.2	55.8	7.1	73.8
Bachelor's degree	36.7	57.8	47.0	75.4	48.1	90.2
Master's degree or higher	14.3	65.4	22.4	86.4	36.5	92.9

* Too few observations to make any inferences.
[1] This analysis includes dropouts.

B4. What Is the Relationship between Behavioral Factors and PSE Attendance?

Student behaviors such as drug and alcohol use, hours spent watching television, skipping or cutting classes, and hours spent doing homework are also factors related to PSE attendance. Table 11A explores these factors for the full sample of students. In most cases, individuals who participate in the harmful behaviors are less likely to attend PSE. For example, for 10th graders that used marijuana more than twice in the past 12 months, 48 percent went on to PSE. This compares to 69 percent of 10th graders who did not use marijuana in the past year. However, it is interesting to note that students who drank alcohol more than twice in the past 12 months were not significantly less likely to attend PSE than those who did. Table 11B explores the same relationships for the low income, high test score students. Among this sample, 52 percent of students who used marijuana attend PSE, and 78 percent of students who did not use marijuana attend PSE.

Table 11A

POSTSECONDARY EDUCATION ATTENDANCE
BY BEHAVIOR AND ATTITUDES[1]

	Grade[2]	Students Who Did		Students Who Did Not	
		%	% Who go to PSE	%	% Who go to PSE
Drank alcohol more than twice in the past 12 months[3]	10th	39.1	65.1	60.9	69.1
	12th	51.7	70.9	48.3	72.2
Used marijuana more than twice in the past 12 months	10th	7.1	47.9	92.9	69.4
	12th	10.0	62.0	90.0	73.1
Watched 3 or more hours of TV per day on weekdays	10th	31.4	58.3	68.6	71.5
	12th	27.3	64.1	72.7	75.8
Skipped or cut classes	10th	15.6	50.1	84.4	69.2
	12th	25.8	63.0	74.2	73.5
Spent less than 5.5 hours per week on homework	10th	48.5	59.9	51.5	74.3
	12th	24.4	61.5	75.6	74.7

1 This analysis includes dropouts.

2 Eighth grade data are available for hours of television, skipped classes, and hours of homework.

3 An example of how to read this table is that in the 10th grade 39 percent of the students reported that they drank alcohol more than twice in the past 12 months. Of those students who drank alcohol more than twice in the past 12 months, 65 percent attend PSE. Of those students who did not drink alcohol more than twice in the past 12 months, 69 percent attend PSE.

Table 11B

POSTSECONDARY EDUCATION ATTENDANCE
BY BEHAVIOR AND ATTITUDES
FOR LOW INCOME, HIGH TEST SCORE STUDENTS[1]

	Grade	Students Who Did		Students Who Did Not	
		%	% Who go to PSE	%	% Who go to PSE
Drank alcohol more than twice in the past 12 months	10th	38.5	71.4	61.5	78.6
	12th	50.7	77.1	49.3	78.4
Used marijuana more than twice in the past 12 months	10th	5.9	51.9	94.1	78.2
	12th	8.9	64.6	91.1	79.0
Watched 3 or more hours of TV per day on weekdays	10th	27.5	68.4	72.5	78.3
	12th	25.5	68.4	74.5	80.5
Skipped or cut classes	10th	13.2	61.0	86.8	78.1
	12th	22.2	71.4	77.8	79.5
Spent less than 5.5 hours per week on homework	10th	37.8	66.1	62.2	81.4
	12th	20.1	63.2	79.9	81.3

[1] This analysis includes dropouts.

Table 12A displays marriage, childbearing behavior, and PSE attendance of all students. Students who are married, have children, or expect these events by age 21 are less likely to attend PSE than those who do not. For example, for students who expected to be married by age 21, 46 percent went on to PSE. This compares to 76 percent of students who did not expect to be married by age 21. Table 12B shows the same relationships for the low income, high test score sample.

Table 12A

POSTSECONDARY EDUCATION ATTENDANCE
BY MARRIAGE AND CHILDBEARING BEHAVIOR[1]

	Students Who Were		Students Who Were Not	
	%	% Who go to PSE	%	% Who go to PSE
Married by second follow-up[2]	1.7	36.1	98.3	72.1
Expected to be married by age 21[3]	14.3	45.8	85.7	76.1
Had child by second follow-up	4.5	31.5	95.5	72.5
Expected to have child by age 21	8.2	36.3	91.8	75.2

[1] This analysis does not include dropouts.

[2] An example of how to read this table is that 2 percent of the students were married by the second follow-up survey. Of those students who were married by the second follow-up survey, 36 percent attend PSE. Of those students who were not married by the second follow-up survey, 72 percent attend PSE.

[3] This number includes those who are already married, and the number of those who expect to have a child by age 21 includes those who already have a child.

Table 12B

POSTSECONDARY EDUCATION ATTENDANCE
BY MARRIAGE AND CHILDBEARING BEHAVIOR
FOR LOW INCOME, HIGH TEST SCORE STUDENTS[1]

	Students Who Were		Students Who Were Not	
	%	% Who go to PSE	%	% Who go to PSE
Married by second follow-up[1]	1.4	*	98.6	78.3
Expected to be married by age 21[2]	12.3	64.5	87.7	80.3
Had child by second follow-up	2.2	*	97.8	78.9
Expected to have child by age 21	5.5	44.6	94.5	80.3

* Too few observations to draw inferences.
[1] This analysis does not include dropouts.

C. USING A MULTIVARIATE FRAMEWORK, WHAT FACTORS ARE RELATED TO PSE ATTENDANCE?

This section attempts to better define the factors important for college enrollment. While the descriptive information provides key data on factors related to PSE attendance, many of the factors examined are correlated with one another. To identify the dominant factors in the determination of PSE attendance, we study the problem in a multivariate framework, where we can examine the effect of each variable on PSE attendance, *holding all other factors constant*. The probability that an individual attends PSE is

$$Pr(PSE \mid x_i) = \frac{e^{B'x}}{1 + e^{B'x}}$$

In this equation, x_i is a vector of the characteristics of the person making the choice. Most educational choice models relate the choice to the future earnings and benefits that stem from the choice. However, the NELS data contain little or no information on future earnings and, even in the most recent wave of the survey, the respondents are just beginning their postsecondary careers. Furthermore, recent research by Manski (1993) raises questions about the ability of educational choice models to separately identify the roles of individual expectations about future earnings and the individual's academic ability.

Because of the difficulties in estimating an educational choice model in the tradition of Willis and Rosen (1979), Manski and Wise (1983), and others, we estimate what may be thought of as a reduced form educational choice model. The independent variables include only characteristics of the individuals making the choice.[14] We will be unable to determine the motivation for the student's choice, but we will be able to determine the ultimate importance of the individual's characteristics in making the choice.

In this model, x includes demographic variables, such as gender, marital status, whether the student has children, race, and information on the student's family; academic factors; behavioral factors; and characteristics of the student's high school. The variables included in the model are:

- Asian, Hispanic, Black, and Native American are the controls included for race. The omitted comparison group is White.
- Information on the student's family includes whether the parents' highest education level is a bachelor's degree or higher, indicator variables for family income categories, and family size.
- High school academic characteristics of the student include test score, the number of college preparatory courses taken,[15] whether the student was in a college preparatory program in high school, and whether the student expected to achieve an education level of a bachelor's degree or higher.
- Behavioral variables of the student include whether the student used alcohol and marijuana more than twice in the past year, the hours of television the student watches on weekdays, and the hours of homework the student does.
- Characteristics of the high school include whether it is in an urban or suburban area (where the omitted comparison group is rural area), what region the school is in (where the included regions are Northeast, Midwest, and South, and the omitted comparison group is West), and whether the school is a Catholic school or another type of private school (where the omitted comparison group is public school.)

[14]We use the characteristics of the "individual" in the broadest sense so that it includes characteristics of the individuals' families, communities, and attended schools.

[15]This is a count of the number of the following courses that the student took: pre-calculus, calculus, biology, chemistry, physics, and foreign language. This information comes from the NELS transcript file.

- Also considered are interactions between whether the individual was in the low income, high score test sample and the following variables: female; whether the parents' highest degree is a bachelor's degree or higher; family size; number of hours of television watched; number of hours spent on homework; whether the school is in an urban area; whether the student went to a Catholic school; and whether the student went to another type of private school. These interactions indicate the additional effect these factors have for the low income, high test score sample over and above the effect they have for the sample as a whole.

Table 13 presents results from a logit model which predicts PSE attendance. The number of observations used in this analysis is smaller than the original 13,120 due to item non-response. The dependent variable is a zero-one variable, with one equal to PSE, and zero equal to no PSE attended. Results are weighted and corrected for survey sampling techniques. The results are shown as odds ratios, which are the change in the likelihood of attending PSE as the variable in question changes by one unit.[16] In the text, we discuss only the effects that are statistically significant.

C1. What Factors Are Important for the Group as a Whole?

Demographic Results: The results show that, all other things equal, women are 50 percent more likely than men to attend PSE. As expected, respondents whose parents received a bachelor's degree or higher are more likely to attend PSE; students in the lowest income group are least likely to attend PSE; and students in the highest income group are most likely to attend PSE.

Other things equal, including income and test score, race does not have a statistically significant effect on PSE attendance. In other words, for students in similar income and test groups, and with other similar demographic characteristics – such as parental education, high school type and location, academic performance, and educational expectations – there are no significant differences in PSE attendance rates by race. However, race is correlated with some of these variables.

[16]The odds ratio is calculated as the coefficient in the logit model multiplied by the probability of attending PSE (evaluated at the mean of the sample) and by the probability of not attending PSE (or one minus the probability of attending PSE). This can be written as $\beta * \{P(Y=1)\} * \{P(Y=0)\}$ where β is the coefficient estimated in the logit model.

Table 13

LOGIT: FACTORS DETERMINING COLLEGE ENROLLMENT PATTERNS[1]

Variable	Odds Ratio (T-Statistic)
Female	1.51** (4.47)
Female* low income high test score sample[2]	1.55 (1.51)
Asian	1.06 (0.27)
Hispanic	1.05 (0.36)
Black	0.98 (-0.10)
Native American	0.73 (-0.90)
Married	0.92 (-0.29)
Children	0.52** (-3.23)
Parents received bachelor's	1.84** (4.99)
Parents received bachelor's* low income, high test score sample	2.10* (1.61)
Low income, high test score group	1.51 (0.71)
Lowest income group	0.68** (-3.65)
Highest income group	1.44** (2.62)
Family size	0.97 (-0.85)
Family size, low income* high test score sample	0.87 (-1.42)
Test score	1.03** (4.53)
College preparatory courses	1.45** (7.17)
College courses missing	1.33 (1.63)
College preparatory program	2.00** (6.50)
Expect bachelor's degree	3.60** (13.62)
Alcohol > twice past year	1.03 (0.28)

Variable	Odds Ratio (T-Statistic)
Alcohol missing	1.11 (0.57)
Marijuana > twice past year	0.63** (-2.94)
Marijuana missing	0.90 (-0.82)
Hours of TV weekdays	0.97 (-0.79)
TV* low income, high test score sample	0.82# (-1.80)
Hours of homework	1.01 (0.52)
Homework* low income, high test score sample	1.24* (2.47)
Urban area school	1.01 (0.10)
Urban* low income, high test score sample	0.44* (-2.41)
Suburban area school	1.10 (1.08)
Northeast	1.08 (0.54)
Midwest	1.08 (0.57)
South	1.00 (0.00)
Catholic school	1.66* (2.30)
Catholic school* low income, high test score sample	4.72# (1.71)
Private school	2.13* (2.44)
Private school* low income, high test score sample	0.18 (-1.36)

[1] Dropouts are not included in this analysis

[2] Designates an interaction with the low income, high test score sample.

* Designates significance at the .05 level..

\# Designates significance at the .10 level.

** Designates significance at the .01 level.

Academic Preparation and Course-Taking Results: In terms of academic preparation, an extra point on the standardized test increases the likelihood of attending PSE by 3 percentage

points[17] (where the mean test score is 50 and the standard deviation is 10), taking college preparatory classes increases the likelihood of PSE attendance by 45 percent, and being in a college preparatory program increases the likelihood of PSE attendance by 100 percent.

There also appears to be a difference in PSE attendance between public and private school attendees. Individuals who attend Catholic school are 66 percent more likely to attend PSE than those who attend public school, and respondents who attend other private schools are 113 percent more likely to attend PSE than those who attend public school. These results, in themselves, are not an argument that private schools are of superior quality to public schools. While we do observe correlations between private schools and PSE attendance, unobserved variables correlated with private school attendance may bias these results. For example, individuals whose parents are more concerned and involved in their children's education may choose to send their children to private school if they do not believe that the public schools are of high enough quality. Therefore, children whose parents value education may be more likely to go to private school. But parental concern about education is probably correlated with PSE attendance, and this may be the result that is measured by the private school variables. Because all of the possible confounding variables are not available to be used as controls in the model, it is not possible to determine the cause of increased PSE attendance without a controlled experiment.

Expectations and Behavioral Results: Expecting to receive a bachelor's degree increases the likelihood of attending PSE by 260 percent. Behavior also has the expected relationship to PSE attendance. Respondents with children are less likely to attend PSE. Use of marijuana more than two times in the past year decreases the likelihood of attending PSE by nearly 40 percent. However, hours spent watching television and hours spent doing homework are not significantly related to PSE attendance for the group as a whole.

[17]When we say that a particular characteristic increases the likelihood of attending PSE we mean that the characteristic is associated with an increased likelihood of attending PSE. Causality cannot be inferred because of possible selection effects.

C2. What Factors Are Especially Important for Low Income, High Test Score Students?

To determine the effects of these factors on just the low income, high test score group, we can examine the magnitude and significance of interactions between these variables and the low income, high test score sample. The data in Table 13 show that watching television, doing an extra hour of homework, and living in an urban area are all statistically significant for the low income, high test score group, but not for the overall group of students. Watching an extra hour of television per evening decreases the likelihood of attending PSE by 15 percent for the low income, high test score sample, and doing an extra hour of homework increases the likelihood of attending PSE by 27 percent for the low income, high test score sample. Low income, high test score respondents who live in urban areas are 56 percent less likely to attend PSE than those who live in rural areas. Differences for low income, high test score students who attend Catholic schools are even larger than for the sample as a whole.

D. USING A MULTIVARIATE FRAMEWORK, WHAT FACTORS ARE RELATED TO THE TYPE OF PSE ATTENDED?

Next we increase the choices to separately model five distinct PSE attendance choices. Table 14 separately examines the probability of attending a 4-year public, 4-year private, less than 4-year public, and less than 4-year private institution. Here, the dependent variable is an indicator for whether the respondent attended no PSE or one of the four types of institutions listed above. Because this model requires a multinomial logit, survey corrected results are not available. However, results are weighted.

Women are more likely than men to attend all four types of schools, but the largest difference is seen in the less than 4-year private schools. Women are 150 percent more likely to attend less than 4-year private schools than are men. Women in the low income, high test score sample are much more likely than men to attend 4-year public institutions. Blacks are more likely than Whites to attend 4-year private institutions. Respondents whose parents received a bachelor's degree or higher are most likely to attend a 4-year private institution.

Higher test scores, taking college preparatory courses, being in a college preparatory program, and expecting a bachelor's degree or higher are associated with increased attendance at all four types of schools, but increase the likelihood of attending a 4-year private institution by the largest amount. Attending a Catholic school is associated with increased attendance at all types of schools except less than 4-year private, and attending another type of private high school is correlated with attending a 4-year private or less than 4-year public institution.

Table 14

MULTINOMIAL LOGIT: TYPE OF POSTSECONDARY INSTITUTION ATTENDED[1]

Variable	Odds Ratio (T-statistic)			
	4-Year public	4-Year private	< 4-Year public	< 4-Year private
Female	1.34** (3.66)	1.72** (5.67)	1.42** (5.04)	2.48** (7.01)
Female* low income, high test score sample[2]	2.05* (2.55)	1.39 (1.00)	1.44 (1.32)	1.26 (0.45)
Asian	1.02 (0.08)	0.98 (-0.09)	1.02 (0.08)	1.56 (1.32)
Hispanic	1.08 (0.56)	1.10 (0.53)	0.96 (-0.34)	1.52* (2.04)
Black	1.32* (2.13)	1.69** (3.16)	0.74* (-2.56)	1.47* (1.87)
Native American	0.97 (-0.08)	0.61 (-0.85)	0.82 (-0.62)	0.00 (0.00)
Married	0.98 (-0.06)	0.43 (-0.99)	0.72 (-1.17)	1.49 (1.08)
Children	0.21** (-4.84)	0.34* (-2.41)	0.57** (-3.38)	0.79 (-0.92)
Parents received bachelor's	2.38** (8.51)	3.27** (10.02)	1.37** (3.28)	1.77** (3.51)
Parents received Bachelor's* low income, high test score sample	1.50 (0.90)	2.04 (1.52)	2.17* (1.74)	3.74* (2.14)
Low income, high test score group	0.93 (-0.13)	1.84 (0.88)	1.79 (1.05)	2.79 (0.99)
Lowest income group	0.77* (-2.50)	0.68* (-2.55)	0.63** (-5.64)	0.81 (-1.38)
Highest income group	1.60** (4.30)	1.67** (4.11)	1.28* (2.45)	1.24 (1.19)
Family size	0.96 (-1.45)	1.01 (0.21	0.96 (-1.52)	1.01 (0.29)
Family size* low Income, high test score sample	0.89 (-1.36)	0.89 (-1.19)	0.87 (-1.67)	0.69* (-1.91)
Test score	1.06** (10.02)	1.08** (10.39)	1.01* (1.87)	1.02** (2.73)

Variable	Odds Ratio (T-statistic)			
	4-Year public	4-Year private	< 4-Year public	< 4-Year private
College preparatory courses	1.81** (14.08)	1.82** (12.14)	1.32** (7.41)	1.18* (2.54)
College courses missing	3.03** (7.33)	2.63** (4.90)	1.01 (0.07)	0.67# (-1.66)
College preparatory program	2.41** (10.09)	2.45** (8.52)	1.70** (6.48)	1.52** (2.83)
Expect bachelor's degree	9.13** (21.43)	9.42** (13.92)	2.81** (14.10)	0.83 (-1.36)
Alcohol > twice past year	1.08 (0.95)	0.79* (-2.42)	1.05 (0.69)	1.01 (0.08)
Alcohol missing	1.53* (2.23)	1.46 (1.62)	0.91 (-0.59)	1.19 (0.59)
Marijuana > twice past year	0.60** (-3.76)	0.44** (-4.48)	0.70** (-3.07)	0.55** (-2.63)
Marijuana missing	0.68** (-2.79)	0.60** (-2.82)	1.09 (0.74)	0.89 (-0.54)
Hours of TV weekdays	0.95# (-1.75)	0.92* (-2.25)	0.99 (-0.56)	0.99 (-0.19)
TV* low income, high test score sample	0.81# (-1.91)	0.76* (-2.09)	0.83 (-1.69)	0.80 (-1.40)
Hours of homework	1.03 (1.29)	1.05# (1.88)	1.00 (-0.10)	0.97 (-0.73)
Homework* low income, high test score sample	1.27** (2.97)	1.26** (2.65)	1.20* (2.35)	1.33** (2.04)
Urban area school	0.80# (-1.94)	0.83 (-1.30)	1.07 (0.71)	1.32 (1.48)
Urban* low income, high test score sample	0.49* (-2.24)	0.38* (-2.56)	0.33** (-3.48)	1.06 (0.12)
Suburban area school	0.77** (-2.88)	0.79* (-2.16)	1.20* (2.33)	1.70** (3.67)
Northeast	1.65** (3.88)	3.91** (9.23)	0.65** (-3.74)	1.62* (2.44)
Midwest	1.74** (4.73)	1.77** (3.97)	0.78* (-2.51)	1.38# (1.76)
South	1.48** (3.51)	1.13 (0.88)	0.86# (-1.66)	0.94 (-0.36)
Catholic school	1.55* (2.18)	2.65** (4.49)	1.55* (2.26)	1.16 (0.42)
Catholic school* low income, high test score sample	8.80# (1.94)	4.81 (1.34)	2.11 (0.59)	0.00 (0.00)
Private school	1.38 (1.12)	4.50** (5.18)	2.18** (2.87)	1.63 (0.99)
Private school* low income, high test score sample	0.12 (-1.58)	0.13 (-1.65)	0.15 (-1.38)	0.00 (0.00)

[1] Dropouts are not included in this analysis

[2] Designates an interaction with the low income, high test score sample.

* Designates significance at the .05 level..

\# Designates significance at the .10 level.

** Designates significance at the .01 level.

E. A SUMMING UP AND SYNTHESIS OF THE FINDINGS FROM THIS SECTION

Both the descriptive findings and the multivariate model results point to the importance of four general factors in determining PSE attendance: academic preparation, course-taking behavior, educational expectations, and behavioral variables. However, even holding all of these factors constant, income effects remain. For example, even within the entire group of students in a rigorous academic high school program, or within the entire group of students taking advanced math or science courses in high school, low income students are still less likely to attend PSE than their higher income counterparts. However, differences among income groups drop significantly when we control for academic preparation or test score.

The importance of income effects on PSE attendance, controlling for other characteristics, is also illustrated in the logit model. In the multivariate regression model — which controls for academic preparation, course-taking behavior, educational expectations, and behavioral variables — income still has a statistically significant effect on PSE attendance. Those in the highest income group are 43 percent more likely to attend PSE and those in the lowest income group are 32 percent less likely to attend PSE, relative to the middle income group. This suggests that financial constraints to college may be more binding for the low income students.

These findings also illustrate the importance of early intervention on PSE attendance. Students form their educational expectations early, and courses taken early on in high school and junior high (or middle school) are closely related to PSE attendance. This indicates that by the end of high school it may be too late to attempt to inform students of the importance of a college education. Rather, information on the importance of college and the requirements for college admission should be distributed to students and their parents as early as possible in the educational system. Additional research should be done in this area. One possible topic that could be explored further in the NELS:88 database is factors related to the determination and the evolution of educational expectations from the eighth grade through the 12th grade.

VI. THE ROLE OF FINANCIAL AID

This section discusses the role of financial aid in PSE attendance. We discuss parents' and students' attitudes toward financial aid and college expenses, use of available resources to obtain information about financial aid, and reasons students do not apply for financial aid. We then examine the effect of being offered financial aid on PSE attendance in a multivariate framework. Lastly, we predict expected financial aid for all students using the NPSAS data set, and examine the effect of predicted financial aid on PSE attendance.

A. HOW DO PARENTS PERCEIVE COLLEGE EXPENSES AND FINANCIAL AID?

Parental views on financial aid and their ability to afford a college education are likely to have a large effect on students' expectations about their education and, ultimately, their PSE attendance. Table 15 examines parental attitudes toward college expenses and financial aid when their children are in eighth grade. Of the parents, 17 percent say they are not willing to go into debt for their child's schooling, and 13 percent say there is too much paperwork required to apply for financial aid. Nearly one-quarter of the parents say they have not been able to get much information about financial aid. Over 11 percent of the parents say they do not believe they will be able to get enough money to allow their child to go to college.

The percentage of parents with these opinions declines, in general, as income and test score increase. Of parents with children in the top test score, bottom income group, 25 percent say they have not been able to get much information on how to apply for financial aid, while 21 percent of those in the top test score, middle income group and 14 percent of those in the top test score, top income group said this was true. Interestingly, among low income students, the percentage of parents indicating they did not see any way of getting enough money for college declined substantially as test scores increased. Within the bottom income group, 28 percent of the low test score group parents said they did not see any way of getting enough money for

college, but only 20 percent of those in the middle test score group and only 12 percent of those in the top test score group said this was true.[18]

Table 15

PARENTAL ATTITUDES TOWARD COLLEGE EXPENSES AND FINANCIAL AID: PERCENTAGE OF PARENTS ANSWERING TRUE[1]

	Full sample	Bottom Family Income			Middle Family Income			Top Family Income		
		Bottom test score	Middle test score	Top test score	Bottom test score	Middle test score	Top test score	Bottom test score	Middle test score	Top test score
The family is not willing to go into debt for schooling	16.5	19.4	16.8	15.3	13.5	15.8	16.5	13.6	18.4	16.5
Too much paperwork is required to apply for financial aid	13.0	15.1	13.0	10.2	15.6	11.8	11.4	13.7	13.9	12.9
I have not been able to get much information on how and where to apply for financial aid	23.8	32.2	29.8	25.4	25.7	25.9	20.6	18.6	15.9	14.2
I do not see any way of getting enough money for my eighth grader to go to college	11.4	28.0	19.8	12.4	9.8	9.1	5.7	2.2	7.1	2.8

Note: questions are asked of parents in 1988 when their child is in the eighth grade.
[1] Dropouts are included in this analysis.

Next we analyze the relationship between these attitudes and PSE attendance. For certain income and test score groups these parental attitudes appear to be somewhat related to PSE attendance. As indicated in Table 16, for both the bottom and top income groups, middle test score students whose parents say they are not willing to go into debt for college are less likely to attend PSE than those who have parents who do not indicate they are debt averse. Table 16 shows that while 46 percent of those in the bottom income, middle test group who say they are not willing to go into debt for college expenses, have children who attend PSE, 55 percent of those parents who

[18]As expected, bottom income group students and parents are most likely to view college expenses and financial aid as an important element in their choice of college. Whereas 26 percent of top income group parents view financial aid as very important, 57 percent of middle income group parents view financial aid as very important, and 80 percent of bottom income group parents view financial aid as very important in choosing a college.

Table 16

PARENTAL ATTITUDES TOWARD COLLEGE EXPENSES AND FINANCIAL AID AND PSE ATTENDANCE: PERCENTAGE IN EACH CATEGORY ATTENDING PSE[1]

	Bottom Family Income						Middle Family Income						Top Family Income					
	Bottom test score		Middle test score		Top test score		Bottom test score		Middle test score		Top test score		Bottom test score		Middle test score		Top test score	
	True	NT[2]	True	NT	True	NT	True	NT	True	NT	True	NT	True	NT	True	NT	True	NT
Family not willing to go into debt for schooling[3]	34.1	32.2	45.9	54.8	73.9	77.1	51.5	51.5	68.3	70.2	88.1	86.9	68.5	70.2	68.9	86.1	95.9	95.6
Too much paperwork to apply for financial aid	30.0	33.6	66.5	51.6	63.0	78.3	66.1	48.2	60.6	71.0	86.8	87.1	73.9	69.8	84.2	82.5	93.6	96.0
I have not been able to get much information on financial aid	31.7	33.9	55.8	52.5	78.8	76.1	42.8	54.1	65.4	71.1	86.0	87.4	75.1	69.1	81.3	82.9	93.9	95.9
I do not see any way of getting enough money for college	27.1	35.2	43.1	55.8	76.7	76.9	46.1	51.5	59.7	70.6	83.1	87.3	***	70.5	***	86.2	***	95.7

[1] Dropouts are included in this analysis.

[2] NT denotes false or "haven't thought about."

[3] An example of how to read this table is that 34 percent of bottom income, bottom test score students whose parents say the family is not willing to go into debt for college attend PSE, and 32 percent of students whose parents say the statement is false or that they have not thought about it attend PSE.

***Observations in these cells are too few to draw inferences from.

say that this is false or that they have not thought about it have children who attend PSE. Of parents in the top income, middle test score group who say they are not willing to go into debt, 69 percent have children who attend PSE and 86 percent of parents who do not answer "true" to this question have children who attend PSE. The fact that parents who are debt-averse have children who are less likely to attend PSE is potentially important, because a large part of college costs are financed through loans.

Students in the bottom income, bottom and middle test score group whose parents say they do not see any way of getting enough money for college are less likely to attend PSE than those who say this is not true or that they have not thought about it. While 27 percent of bottom income, bottom test score group students whose parents say they do not see any way of getting enough money for college attend PSE, 35 percent whose parents say this is false or have not thought about it attend PSE. Similarly, while 43 percent of bottom income, middle test score students whose parents say they do not see any way of getting enough money for college attend PSE, 56 percent of those who say this is false or have not thought about it attend PSE.

B. HOW MUCH INFORMATION DO PARENTS ATTEMPT TO OBTAIN ABOUT FINANCIAL AID?

Students and their parents can learn about financial aid by several avenues. These include talking to teachers, counselors, school representatives, or loan officers, and reading information from the U.S. Department of Education, from high schools or colleges, or from the military. Table 17 examines the extent to which students and their parents, among those planning to attend college in the 12th grade, take advantage of such resources and how their use varies by family income.[19] We find that middle income parents and bottom and middle income students are most likely to use these resources. While 55 percent of bottom income parents spoke to someone about financial aid, 67 percent of middle income parents spoke to someone, and 62 percent of top

[19]Those students who answer "no" to the question, "Do you plan to continue your education past high school some time in the future?" are not asked questions about reading information or speaking with someone about financial aid. Those parents who answer "no" to the question, "Does your teenager plan to continue his/her education?" are not asked these questions either. Students and parents are both surveyed when the student is in the 12th grade as to whether they used these information sources.

income parents spoke to someone. While 59 percent of students in the bottom income group read information about financial aid, 58 percent of the students in the middle income group read information about financial aid, and 50 percent of students in the top income group read information about financial aid.

Table 17

KNOWLEDGE ABOUT FINANCIAL AID BY FAMILY INCOME[1]

		Full sample	Family Income		
			Bottom	Middle	Top
Talked to teacher, counselor, school representative, loan officer, or knowledgeable adult about financial aid	Student[2]	74.8	77.3	78.0	66.8
	Parent	61.6	54.8	67.2	61.7
Read information from U.S. Department of Education, from school or college, or from military about financial aid	Student	56.5	59.4	58.3	49.7
	Parent	61.2	54.4	66.2	62.2

[1] Dropouts are included in the parent information.

[2] An example of how to read this table is that 75 percent of all students spoke to someone about financial aid, 77 percent of low income students spoke to someone about financial aid, 78 percent of middle income students spoke to someone about financial aid, and 67 percent of high income students spoke to someone about financial aid.

Next we examine use of these resources by test score. Table 18 shows that among those planning to attend PSE in the 12th grade, students in the top test score group and parents with children in the top test score group are most likely to take advantage of these resources. While 79 percent of students in the top test score group spoke to someone about financial aid, 70 percent of students in the bottom test score group spoke to someone. While 73 percent of parents in the top test score group read information about financial aid, 47 percent of parents in the bottom test score group read information.

Table 18

KNOWLEDGE ABOUT FINANCIAL AID BY TEST SCORE[1]

		Full sample	Test Score		
			Bottom	Middle	Top
Talked to teacher, counselor, school representative, loan officer, or knowledgeable adult about financial aid	Student[2]	74.8	69.9	73.3	79.3
	Parent	61.6	49.2	60.4	72.2
Read information from U.S. Department of Education, from school or college, or from military about financial aid	Student	56.5	50.6	53.6	62.8
	Parent	61.2	47.2	60.0	73.0

[1] Dropouts are included in the parent information.

[2] An example of how to read this table is that 75 percent of all students spoke to someone about financial aid, 70 percent of low test score students spoke to someone about financial aid, 73 percent of middle test score students spoke to someone about financial aid, and 79 percent of high test score students spoke to someone about financial aid.

Next we examine the relationship between use of these resources and applications for financial aid. Individuals who learn more about financial aid are expected to be more likely to apply for financial aid. Table 19 shows that, in some cases, the use of these resources has a strong relationship to knowledge about financial aid. Parents who planned on their child attending college in the 12th grade and who read information about financial aid are more likely to say that their child did not apply because too much paperwork was required. Parents who read information are less likely to say that they did not apply for financial aid because they had not been able to get much information. While 24 percent of parents who do not read information give this as a reason why their child did not apply for financial aid, only 15 percent who do read information give this reason. Parents who read information or speak to someone about financial aid are also less likely to say their child did not apply because they did not know how. While 26 percent of parents who did not read information say they did not apply because they did not know how, only 13 percent of parents who did read information give this reason. All of these results may be because the available material was useful, or because the people who read the materials are more likely to understand and participate in the financial aid application process.

Table 19

KNOWLEDGE ABOUT FINANCIAL AID AND FINANCIAL AID APPLICATIONS[1]

			% of Parents who say that their teenager did not apply for financial aid because				
			Teenager is not eligible because he/she will only attend part-time	Too much paperwork is required to apply	Have not been able to get much information on how or where to apply	No money is available for financial aid	Do not know how to apply
Talked to teacher, counselor, school representative, loan officer, or knowledgeable adult about financial aid	Student[2]	yes	7.4	10.9	21.2	10.6	20.3
		no	10.7	12.2	16.7	9.0	19.5
	Parent	yes	10.0	11.3	16.6	10.6	13.7
		no	12.2	10.5	22.0	9.6	25.4
Read information from U.S. Department of Education, from school or college, or from military about financial aid	Student	yes	7.2	11.8	21.8	10.9	20.2
		no	10.0	11.1	17.7	9.4	19.8
	Parent	yes	9.8	11.8	14.6	10.6	13.3
		no	12.5	10.0	23.8	9.7	25.9

[1] Dropouts are included in the parent analysis.

[2] An example of how to read this table is that 7 percent of students who spoke to someone about financial aid have parents who say their teenager did not apply for financial aid because the teenager is not eligible for financial aid because he/she is only going part-time and 11 percent of students who did not speak to someone about financial aid had parents who said their teenager did not apply for financial aid because the teenager was not eligible because he/she was only going part-time. Ten percent of parents who spoke to someone about financial aid say their teenager did not apply for financial aid because the teenager is not eligible for financial aid because he/she is only going part-time and 12 percent of parents who did not speak to someone about financial aid said that their teenager did not apply for financial aid because the teenager was not eligible because he/she was only going part-time.

The relationship between the use of these resources and PSE attendance is shown in Table 20. Students who planned to attend college in the 12th grade and who talked or read about financial aid, or have parents who did so, are more likely to attend PSE than those who do not. This is probably largely due to the fact that individuals who do so are more interested in attending PSE. While 79 percent of students who speak to someone about financial aid attend PSE, only 60 percent of students who do not speak to someone about financial aid attend PSE. While 80 percent of students whose parents speak to someone about financial aid attend PSE, only 54 percent of students whose parents do not speak to someone about financial aid attend PSE.

Table 20

KNOWLEDGE ABOUT FINANCIAL AID
AND THE DECISION TO ATTEND POSTSECONDARY EDUCATION[1]

			Percent Attending PSE
Talked to teacher, counselor, school representative, loan officer, or knowledgeable adult about financial aid	Student[2]	yes	78.6
		no	59.7
	Parent	yes	80.4
		no	54.3
Read information from U.S. Department of Education, from school or college, or from military about financial aid	Student	yes	79.4
		no	66.7
	Parent	yes	79.9
		no	55.6

[1] Dropouts are included in the parent analysis.

[2] An example of how to read this table is that 79 percent of students who spoke to someone about financial aid attended PSE and 60 percent of students who did not speak to someone about financial aid attended PSE.

Table 21 examines this relationship for low income, high test score students. The difference among these students is even larger, probably because these students are more likely to need financial aid. While 84 percent of these low income, high test score students who planned to attend college in the 12th grade and who spoke to someone about financial aid attend PSE, only 53 percent of these students who did not speak to someone about financial aid attend PSE. While 88 percent of low income, high test score students whose parents spoke to someone about

financial aid attend PSE, only 61 percent of these students whose parents did not speak to someone about financial aid attend PSE.

Table 21

KNOWLEDGE ABOUT FINANCIAL AID
AND THE DECISION TO ATTEND POSTSECONDARY EDUCATION:
BY LOW INCOME, HIGH TEST SCORE RESPONDENTS[1]

			% Attending PSE
Talked to teacher, counselor, school representative, loan officer, or knowledgeable adult about financial aid	Student[2]	yes	84.0
		no	52.9
	Parent	yes	88.0
		no	60.7
Read information from U.S. Department of Education, from school or college, or from military about financial aid	Student	yes	84.3
		no	67.8
	Parent	yes	86.4
		no	64.7

[1] Dropouts are included in the parent analysis.

[2] An example of how to read this table is that 84 percent of low income, high test score students who spoke to someone about financial aid attended PSE and 53 percent who did not speak to someone about financial aid attended PSE.

C. WHY DO SOME STUDENTS FAIL TO APPLY FOR FINANCIAL AID?

While we may expect some students in the top income group not to apply for financial aid, we also find that many low income students do not apply for financial aid. We next examine reasons why students who plan to continue their education do not apply for financial aid, as reported by parents when students are in the 12th grade. Table 22 shows that the reason those in the top income group are most likely to give for not applying for financial aid is that they did not need it. The reason individuals in the bottom income, low and middle test score groups are most likely to give is that the teenager's grades were not high enough to qualify for a loan or scholarship. The reason those in the bottom income, top test score group are most likely to give is that

Table 22

WHY STUDENTS HAVE NOT APPLIED FOR FINANCIAL AID, AS REPORTED BY PARENTS: BY INCOME AND TEST SCORE[1]

	Bottom Family Income			Middle Family Income			Top Family Income		
	Bottom test score	Middle test score	Top test score	Bottom test score	Middle test score	Top test score	Bottom test score	Middle test score	Top test score
Family and teenager can pay without assistance	11.5	15.2	21.8	29.6	38.8	41.6	65.9	64.1	80.8
Teenager's grades are not high enough to qualify for a loan or scholarship	28.3	31.5	18.7	38.8	32.0	18.9	33.7	39.1	17.5
Neither we nor our teenager wishes to report our financial information	14.3	12.2	18.1	12.6	9.4	9.7	14.9	14.0	10.4
Our teenager is not eligible because he/she will only attend part-time	17.9	13.7	8.4	14.7	9.1	7.2	14.7	11.0	2.6
Too much paperwork is required to apply for financial aid	9.4	7.9	11.5	9.2	11.0	14.1	12.4	9.8	13.3
Have not been able to get much information on how or where to apply for financial aid	25.7	22.7	24.0	19.7	21.7	19.7	16.6	13.4	10.8
No money is available for financial aid	15.2	12.2	9.0	6.8	9.3	8.0	7.9	8.5	9.8
Other relatives will help pay for my teen's college expenses	5.6	9.8	10.6	5.8	6.4	9.3	5.6	9.5	6.0
We missed the deadline for application	9.5	16.1	15.5	10.2	10.9	14.9	6.2	7.3	5.1
I do not know how to apply	24.6	29.0	25.3	19.5	23.6	17.9	19.9	14.9	8.7

[1] Dropouts are included in this analysis.

they did not know how to apply. Of low income, high test score parents, 25 percent say that they did not apply because they did not know how, and 24 percent say that they did not apply because they had not been able to get much information on how to apply for financial aid. This compares to 18 percent of the middle income, high test score parents and 9 percent of the high income, high test score parents who say that they did not know how to apply, 20 percent of the middle income, high test score parents, and 11 percent of the high income, high test score parents who said that they had not been able to get enough information.

D. IS FINANCIAL AID AVAILABILITY A CRITICAL FACTOR FOR DETERMINING PSE ATTENDANCE?

D1. Use of Data Available in NELS

Next we explore the effect of financial aid availability on PSE attendance. Because of data limitations, we first explore the effect of being awarded financial aid for only those respondents who apply to PSE, are accepted, and apply for financial aid at private 4-year or public 4-year institutions. Twenty-five percent of those who apply to private 4-year institutions, are accepted, and apply for financial aid are not awarded financial aid, and 35 percent of those who apply to public 4-year institutions, are accepted, and apply for financial aid are not awarded financial aid.[20] If students who are not awarded financial aid are less likely to attend PSE, this may provide some indication of the effect of financial aid on PSE attendance.

There are many problems with this type of analysis, however. First, this analysis does not begin to explore the effect of finances and student aid on the initial decision to apply to college. This is a potential problem because individuals who do not believe they can afford PSE may not even apply. This analysis only addresses the small group of students who apply to PSE, are accepted, and apply for financial aid, but do not attend any PSE or do not attend the type of PSE where they were not offered financial aid. In addition, it is not clear why these students, especially the low income students, do not receive financial aid. One possible explanation is that

[20]Twelve percent of low income students are not awarded financial aid at private 4-year institutions, and 20 percent of low income students are not awarded financial aid at public 4-year institutions.

the students did not pursue the financial aid application process to completion. In that case, students who did not attend PSE would be those who did not receive financial aid, because of lack of interest and incomplete applications, rather than because they were denied financial aid. Another potential problem with this method of analysis is that many colleges award some financial aid based on ability as well as on need. Therefore, those students who are awarded more financial aid may be those of higher ability who are more likely to go to college anyway. However, since we can control for ability with test scores in the multivariate model, this may not be a significant problem. Also, schools may use ability more to decide how much aid to give a student, relative to his or her need, rather than whether or not to give aid at all. If that is the case, then we would expect the bias caused by this problem to be less significant, because we are only modeling the effect of whether or not any financial aid was awarded on PSE attendance, rather than the effect of different amounts of financial aid on PSE attendance.

We begin with a univariate analysis of financial aid awards and PSE attendance. Table 23A examines the relationship between being offered aid at private 4-year institutions and attending PSE for students who apply to private 4-year institutions, are accepted, and apply for financial aid at these types of schools. We find that students who are offered financial aid at private 4-year institutions are more likely to attend private 4-year institutions than are respondents who apply, are accepted, and apply for aid, but are not offered aid at private 4-year institutions. While 72 percent of those who are offered aid at private 4-year institutions attend private 4-year institutions, 61 percent of those who are not offered aid at private 4-year institutions attend this type of PSE. Respondents who are not offered aid at private 4-year institutions are more likely to attend public 4-year institutions than those who are offered aid at private 4-year institutions. While 15 percent of those who are offered aid at private 4-year institutions attend public 4-year institutions, 20 percent of those who are not offered aid at private 4-year institutions attend public 4-year institutions. However, we find that being offered financial aid at a private 4-year institution does not appear to be related to the decision of whether to attend any type of PSE. While 3 percent of those who are offered aid at a private 4-year institution do not attend PSE, 5 percent of those who are not offered aid at a private 4-year institution do not attend PSE.

Table 23A

PERCENTAGE ATTENDING PSE
BY WHETHER OFFERED AID AT A PRIVATE 4-YEAR INSTITUTION
FOR THOSE WHO APPLY, ARE ACCEPTED, AND APPLY FOR AID
AT A PRIVATE 4-YEAR INSTITUTION[1]

	Percent Attending PSE							
	Offered Financial Aid at Private 4-Year				Not Offered Financial Aid at Private 4-Year			
	All	Income Group			All	Income Group		
		Bottom	Middle	Top		Bottom	Middle	Top
No PSE	3.3	3.3	3.9	2.5	5.4	*	8.2	2.8
Public 4-year	14.5	11.5	17.3	12.7	20.2	*	23.1	17.7
Private 4-year	71.6	72.1	67.4	77.4	60.9	*	55.4	70.1
Less than 4-year public	10.3	12.8	11.4	6.6	12.0	*	12.0	9.4
Less than 4-year private	0.3	0.3	0.0	0.9	1.5	*	1.4	0.0

* Denotes too few observations.
[1] Some dropouts are included in this analysis.

Table 23B explores the same relationships for students who apply, are accepted, and apply for financial aid at public 4-year institutions. We find similar differences between those offered aid and those not offered aid as in private institutions. While 77 percent of those who are offered aid at public 4-year institutions attend public 4-year institutions, 68 percent of those who are not offered financial aid at public 4-year institutions attend public 4-year institutions. There are interesting differences by income in the types of schools attended by students who do not receive aid at public 4-year institutions. While low income respondents who are not offered financial aid at public 4-year institutions are more likely not to attend any type of PSE, high income respondents who are not offered aid at public 4-year institutions are more likely to attend less than 4-year public institutions. While 4 percent of bottom income students who are offered financial aid at 4-year public institutions do not attend PSE, 13 percent of bottom income students who are not offered financial aid at 4-year public institutions do not attend PSE. While 14 percent of top income students who are not offered financial aid at public 4-year institutions attend less than 4-year public institutions, 22 percent of top income students who are not offered financial aid at 4-year public institutions attend less than 4-year public institutions.

Table 23B

PERCENTAGE ATTENDING PSE
BY WHETHER OFFERED AID AT A PUBLIC 4-YEAR INSTITUTION
FOR THOSE WHO APPLY, ARE ACCEPTED, AND APPLY FOR AID
AT A PUBLIC 4-YEAR INSTITUTION[1]

	Percent Attending PSE							
	Offered Financial Aid at Public 4-Year				Not Offered Financial Aid at Public 4-Year			
	All	Income Group			All	Income Group		
		Bottom	Middle	Top		Bottom	Middle	Top
No PSE	3.5	4.2	3.2	1.6	6.5	13.1	5.7	4.6
Public 4-year	76.5	72.7	78.4	81.2	67.5	62.1	68.8	67.0
Private 4-year	3.3	2.5	4.3	2.3	3.6	0.6	3.2	6.0
Less than 4-year public	15.9	19.2	13.5	14.3	21.3	22.2	20.9	22.3
Less than 4-year private	0.9	1.4	0.7	0.6	1.1	2.0	1.5	0.2

[1] Some dropouts are included in this analysis.

We next incorporate a modeling framework to examine the effect of financial aid on PSE attendance. In this model, we control for family income and ability (using test scores). We also control for all of the other factors examined in our earlier analysis of the determinants of PSE attendance. The independent variable of interest is an indicator of whether the student was offered financial aid at a public or private 4-year institution. Table 24A shows that respondents who are offered financial aid at a private 4-year institution are more likely to attend a private 4-year institution than those who apply, are accepted, and apply for aid but are not offered aid at a private 4-year institution. As a whole, those students who are offered financial aid at a private 4-year institution are 80 percent more likely to attend a private 4-year institution. Table 24B examines the same relationships at public 4-year institutions. We find similar results for this type of institution. Respondents who are offered financial aid at a public 4-year institution are more likely to attend a public 4-year institution than those who apply, are accepted, and apply for aid but are not offered aid at a public 4-year institution. As a whole, students who are offered financial aid at a public 4-year institution are 80 percent more likely to attend a public 4-year institution. Middle income students are 125 percent more likely to attend a public 4-year institution if they are offered financial aid at a public 4-year institution.

Table 24A

EFFECT OF BEING OFFERED FINANCIAL AID AT A PRIVATE 4-YEAR INSTITUTION ON ATTENDANCE AT A PRIVATE 4-YEAR INSTITUTION FOR THOSE WHO APPLY, ARE ACCEPTED, AND APPLY FOR AID AT A PRIVATE 4-YEAR INSTITUTION[1]

Variable[2]	Odds Ratio[3] (T-statistic)			
	Full Sample	Family Income		
		Bottom	Middle	Top
Offered financial aid at a private 4-year institution	1.78* (2.31)	3.83# (1.72)	2.08# (1.73)	1.38 (0.78)

1 Dropouts are not included.
2 Other control variables in this model are the same as the control variables in Table 13.
3 Of the full sample of respondents included in our multivariate model of PSE attendance, 7 percent are included here.
* Designates significance at the .05 level.
# Designates significance at the .10 level.

Table 24B

EFFECT OF BEING OFFERED FINANCIAL AID AT A PUBLIC 4-YEAR INSTITUTION ON ATTENDANCE AT A PUBLIC 4-YEAR INSTITUTION FOR THOSE WHO APPLY, ARE ACCEPTED, AND APPLY FOR AID AT A PUBLIC 4-YEAR INSTITUTION[1]

Variable[2]	Odds Ratio[3] (T-statistic)			
	Full Sample	Family Income		
		Bottom	Middle	Top
Offered financial aid at a public 4-year institution	1.80** (3.11)	1.31 (0.57)	2.25** (3.35)	2.04 (1.58)

1 Dropouts are not included.
2 Other control variables in this model are the same as the control variables in Table 13.
3 Of the full sample of respondents included in our multivariate model of PSE attendance, 14 percent are included here.
** Designates significance at the .01 level.

D2. Use of NPSAS Data to Predict Financial Aid

Next we use predictions of financial aid from the 1993 NPSAS database to estimate the effect of varying levels of financial aid on PSE attendance. This is necessary because the NELS database contains information only on the total amount of financial aid received by those students who actually attend PSE and whether or not certain types of financial aid were received. Thus, NELS does not contain the amount of financial aid received by type of award, nor does NELS contain the expected financial aid for those not attending PSE. Furthermore, using these imputations we can analyze the effect that expected financial aid may have on PSE attendance for all students. This is important because students' expectations for educational attainment may be affected early on by whether they expect to be eligible for financial aid. These expectations may affect behavior much before the student is ready to attend PSE.

Unlike the analysis in D1 above, here we examine the effect of financial aid on PSE attendance for *all* students, and we examine financial aid amounts rather than only whether financial aid was awarded. This analysis also addresses the larger problem of the full group of students who do not attend PSE, rather than just the 11 percent of students who apply, are accepted, and do not receive financial aid.

Two different matching techniques were employed to predict financial aid for respondents in the NELS sample. The first was regression analysis to predict financial aid, and the second was a statistical matching procedure where respondents from NELS were matched with respondents from NPSAS based on a number of characteristics.

a. Prediction of Financial Aid through Regression Analysis

The first method used to predict financial aid involves estimation of ordinary least squares models using the NPSAS data. The resulting coefficients from these estimates were used to calculate predicted financial aid for NELS respondents. Variables available in both datasets which were used in the prediction were: gender, race, marital status, whether the students' parents' highest level of education was a bachelor's degree or higher, state of residence, income

level, number of family members, whether the student expected to receive a bachelor's degree or higher, Catholic school attendance, and other type of private school attendance. All undergraduates between the ages of 17 and 24 were included in the estimation. The only ability measures included in NPSAS are SAT and ACT scores, and these scores are not available for a large number of NELS and NPSAS respondents. Therefore, no ability measures were used in the match.

Data from NPSAS were used to predict three variables: the total need-based aid received; Pell grant amount received; and total federal grants received. These variables were chosen because they were thought to be least likely to be correlated with ability. Total grant aid was not predicted because it is correlated with ability. If financial aid measures that were correlated with ability were employed, effects on financial aid may have been upwardly biased. Consequently, these financial aid variables may have measured the effect of ability on PSE attendance, as well as the effect of receipt of financial aid on PSE attendance.

Results from the first stage regression were used in a logit model to determine the effect of financial aid on PSE attendance. In the many different specifications run, financial aid was not found to have a significant effect on PSE attendance. These specifications included:

- Effect of the different types of financial aid on PSE attendance for the entire sample.
- Effect of the different types of financial aid on PSE attendance, separately for each of the three income groups.
- Effect of the different types of financial aid on attendance at 4-year public schools.
- Effect of the different types of financial aid on attendance at 4-year private schools.

There are several possible explanations for the lack of significant effects. The first, of course, is that financial aid received does not really have an effect on the decision to attend PSE or to attend a private school rather than a public school or a 4-year institution rather than a 2-year institution. However, another plausible explanation is that the predicted financial aid amounts

are not very good predictions of financial aid received. These predictions may be the best that can be made, given the available data. Evidence of the inadequacy of the predictions is the r-squared scores from the first stage regressions. The r-squared tells us how well the financial aid has been predicted on a scale from 0 to 1. These values range from 0.05 to 0.48, which means that over half of the variation in financial aid was not explained by the included independent variables. Additionally, a reason for a lack of significant results may be the entitlement nature of the financial aid programs — students with similar financial characteristics receive similar amounts of financial aid. Therefore, it may not be possible to find a control group that is similar except for the amount of financial aid received. These results may also be pointing out the limitations of combining two very different data sets.

b. Prediction of Financial Aid through Statistical Matching

Westat employed a statistical matching procedure to estimate different types of financial aid received. This procedure involved matching NELS respondents with NPSAS respondents with similar characteristics. All first-year full-time undergraduate students in the NPSAS sample were included in the matching procedure. The sample was divided into dependent and independent students. The NPSAS dataset divided the sample into these two groups, and in NELS, individuals were considered independent if they were married or had children. Dependent students were matched by age, region of family residence, family income, family size, and parents' marital status. Independent students were matched only by age and region of residence. Information on aid receipt was predicted separately for students attending public 4-year colleges, private 4-year colleges, public less than 4-year colleges, and private less than 4-year colleges. Each student in the NELS panel was separately matched to an NPSAS student attending each of the four types of institutions.

The predicted financial aid variables were then used in logit models to determine the effect of financial aid on PSE attendance. The predicted financial aid variables included Pell grants, total institutional grants, total state grants, total federal grants, total financial aid, and total loans. Logit models employed included:

- Effect of the different measures of financial aid on 4-year public or private PSE attendance as compared to no PSE or other types of PSE attendance.
- Effect of the different measures of financial aid on 4-year private PSE attendance as compared to 4-year public PSE attendance.
- Effect of the different measures of financial aid on 4-year PSE attendance as compared to 2-year PSE attendance.
- Effect of the different measures of financial aid on 2-year PSE attendance as compared to no PSE attendance.

Results were estimated for the sample as a whole and for the three different income groups. In virtually all of the models employed, financial aid was not found to have a significant effect on PSE attendance. Again, either financial aid has no effect on PSE decisions, or the model's limitations, the entitlement nature of the financial aid programs, and the combining of two very different data sets, are preventing accurate predictions of financial aid received.

E. A SUMMING UP AND SYNTHESIS OF THE FINDINGS FROM THIS SECTION

In this section we have found some evidence for the importance of financial aid knowledge, information, and receipt on PSE attendance. The NELS data showed that nearly a quarter of the parents reported that they had not been able to get enough information about financial aid when their children were in the eighth grade, and that the percentage of the parents who had not been able to get enough information declined as income increased. While complete financial aid information is not necessary in the eighth grade, it may be important for parents to realize that financial aid is available at this point so they believe they can afford to send their child to PSE. In fact, there does appear to be some inverse relationship between negative attitudes by parents toward college expenses and financial aid in the eighth grade and PSE attendance.

When deciding among institutions, both students and their parents view financial aid as more important than college expenses. Low income group individuals are more likely to view these factors as important in the choice of a college. Parents who have children in the higher test

score groups are less likely to view college expenses and financial aid as very important in choosing a college.

Students in the lower and middle income groups and the higher test score groups are more likely to attempt to obtain information about financial aid. The relationship between use of these resources and knowledge about financial aid appears to be strong, and the relationship between use of these resources and PSE attendance, even stronger. Those who do not use these resources are less likely to attend PSE. This may be because students and parents who are more interested in PSE are more likely to make the effort to obtain information about financial aid.

The most common reason parents give that low income students do not apply for financial aid are because their grades are not high enough, they did not know [illegible] apply, and they were not able to obtain enough information. This suggests that more education about financial aid should be provided in the schools to address these problems.

After controlling for income, test socre, and other personal characteristics, we found that among students applying to PSE, those who are offered financial aid at public and private 4-year institutions are more likely to attend these types of institutions than those who are not offered financial aid. However, this analysis does not address the problem of individuals who do not apply to PSE or who do not apply for financial aid. Individuals who do not believe they can afford PSE may not apply, and individuals who do not believe financial aid is available may not apply for financial aid. To examine the effect of the amount of financial aid received on PSE attendance for the entire sample, we predicted financial aid with the NPSAS data set using two different statistical methods. Predicted financial aid was not found to have a significant effect on PSE attendance.

APPENDIX

VARIABLE DEFINITIONS

College Preparatory Courses: Used in the logit model, this is a count of the number of the following courses that the student took: pre-calculus, calculus, biology, chemistry, physics, and foreign language. (Uses NELS variables F2RPRE_C, F2RCAL_C, F2RBIO_C, F2RCHE_C, F2RPHY_C, F2R16_C.)

College Preparatory Program: This variable is used in the logit model. Students are asked in the second follow-up survey to describe their current high school program. If the student describes the program as "college prep," then this variable is equal to one. If the student describes a different type of high school program, this variable is equal to zero. (Uses NELS variables BYS49, F1S20, F2S12A.)

High School Program: This variable is used in table 7. The high school program is defined in the following categories rigorous academic, academic, vocational, academic/vocational, or none of the above. A rigorous academic high school program is defined as at least 4 units of English, at least 3 units of social studies, at least 3 units of science, at least 3 units of math, and at least .5 units of computer science. An academic high school program is defined as a total of 12 units in english, social studies, science, and math. A vocational track is defined as at least 3 units in one of several vocation subjects. An academic/vocational track is defined as meeting the requirements for both the academic and the vocational programs. (Uses NELS variable F2RTRPR6.)

Income Group: Family income level is defined using total family income, as provided by the parents in the base-year and second follow-up questionnaires. We divided the family income levels in the base and second follow-up years into bottom, middle, and top groups with approximately one-third of the students in each category. Because the income was provided in levels, rather than exact amounts, the groups could not be divided into exact thirds. In the base year, the weighted percents in the three groups were 38 percent in the bottom, 39 percents in the middle, and 23 percent in the top. In the second follow-up, the weighted percents in the three groups were 34 percent in the base group, 34 percent in the middle group, and 32 percent in the top group. Because the income data is missing for many respondents, we use the base year income group when available, and when the base year income group is not available, we use the second follow-up income group. (Uses NELS variables BYP8O, F2P74.)

PSE Attendance: Postsecondary attendance is defined using the variable which documents the type of the valid postsecondary institution with the latest initial enrollment date. Individuals who are coded as a legitimate skip are defined as not attending PSE. Private schools less than 4 years are defined to include private for profit schools. (Uses NELS variable PSELASTY.)

Test Score Group: Multiple choice tests were administered to NELS respondents in reading comprehension, mathematics, science, and history/citizenship/geography. While all students received the same set of tests in the base year, multiple forms of the math and reading tests were administered in the follow-up years. These tests were targeted to the students' ability levels. The test score used in our analyses is the composite reading/math test score. We divided the base

year test scores into the bottom, middle, and top groups, with one-third of the students in each category. If the base-year test score was not available, then the students were placed according to the first follow-up test, and if both the base-year test and the first follow-up test were missing, then the students were placed according to their ranking in the second follow-up test. (Uses NELS variables BY2XCOMP, F12XCOMP, F22XCOMP.)

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